

Feb 6, 1967

~~CONFIDENTIAL~~



167-671
D/C

NOTES 2-6-67
WITH COMMENTS

MR. GORMAN'S COPY

~~CONFIDENTIAL~~

Grau and Geissler notes

to U Box 2-9-67

5-31-67

NOTES 2-6-67 GRAU

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1. QUALITY & RELIABILITY REQUIREMENTS: This Laboratory is in the process of proposing to Dr. Rudolph what can be done to improve and maintain the quality of each stage. Emphasis will be given to reinstate those features which had previously been eroded away due to cost and schedule trade-offs (not necessarily an MSFC invention). Such a program will require money but will also require attention to other problems which have plagued us such as the difficulty to maintain the proper skill mix caused by cuts in the number of spaces without provisions for controlling the area of attrition, at a time where we are still running through our peak workload period and are supposed to implement a reduction in support contractor help.
2. BROWN ENGINEERING QUALITY SURVEY: A quality survey was made of the Brown Engineering, Lewisburg, Tennessee, facility. The contractor's inspection system was exceptionally well planned and operated. Only a few discrepancies were noted. ✓

Harry S.

FYI and

comment
B

5
12

1 a.
weekly notes

SENSITIVE

5-31-67

NOTES 2/6/67 GEISSLER

2/6/67

B2/7

1. Promotion Freeze: The recently, and suddenly applied freeze on promotions from GS-13 to GS-14 has stopped several actions relative to key professional personnel. The immediate effect of the freeze will be that the employees whose promotions were in Personnel at the time of the freeze will look elsewhere for employment unless we can obtain immediate relief. Caught in the freeze were a branch chief, Voyager project engineer, secretary of the Flight Evaluation Working Group, Group chief in Advanced Projects Office and others. The branch chief caught in the freeze is chief of our Mission Analysis Branch, the group responsible for mainstream Apollo and AAP mission analysis. This branch has been hit hard by personnel losses in the past and additional losses will make the branch virtually ineffective.

The longer range problems that we are faced with due to the freeze will be a constant turn over of grades 12 and 13 which represents our laboratory's main productive work force. The total professional work force of the laboratory is 306 people of which 62 are GS-13 and 68 are GS-12 or a total of 40%. With the freeze primarily affecting the immediate future of these employees, we must anticipate a high turnover among this group.

Harry G.

I think

I've read

that on

the Washington

level

they are

just on freezing

promotions in the higher grades.

How come? Anything we can do

to help Geissler? B

SENSITIVE

1 a.

weekly notes

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B 2/7

NOTES BALCH [✓]1967
908 2/6

S-II-2 Test Program - The stage is still scheduled to arrive at MTF on 2/11/67. A presentation of the S-II-2 processing plan was made to MTF and stage office representatives on 2/1/67. MTF comments on this plan will be furnished S&ID by 2/8/67. GSE modification work on the S-II A-2 stand continues and is presently in support of the S-II-2 test program. ✓

S-IC-3 Testing and B-2 Activation - Propellant load test is now scheduled for 2/9/67 and 2/10/67 although components testing is not complete and dry runs have not been conducted in a simulated static firing mode. Any major problems in accomplishment of most prerequisite activities could impact start of propellant load test. First static firing is targeted for 2/16/67. ✓

S-II A-1 Activation - All high pressure gas systems except the GH_2 system are expected to be fully operational by the middle of this week. All the GH_2 systems except the purge line in the LH_2 system and screw-type connections on the vent system is also expected to be fully operational by this time. The auxiliary derrick has been turned over by the Corps of Engineers, and turn over of the main derrick is expected on 2/7/67. All squawks developed from running cold shock of LOX system on 1/29/67 have been cleared. Presently, it appears that cold shock of the LH_2 fill and vent system can be run by the end of February. ✓

S-IC-4 Test Program - Review of the End Item Test Plan was completed last week. Comments, which included extensive revisions, have been compiled and discussed informally with Boeing. ✓

Visit of U. S. Congressman Teague to MTF - Preparations are now under way for Congressman Teague's expected visit to MTF next Saturday 2/11/67. ✓

Inquiries on Impact of Recent Apollo Accident on MTF - A number of inquiries have been received from news media on this matter. All have been answered to the effect that the stage hardware with which MTF is concerned is not involved and that no information has been received that the overall program at MTF will be affected. ✓

958 2/6

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LOCAL SCIENTIFIC SURVEY MODULE (LSSM):

Tasks amounting to \$60 thousand have been awarded to each contractor (Bendix and Boeing) to continue effort as of February 1. Headquarters indicated \$300 thousand will be available to continue parallel contractor effort until July 1, 1967, when a single contractor will be chosen. ✓

PHASE "D" PROPOSAL GUIDELINES:

Phase "D" proposal guidelines for the AAP Payload Integration Project were formally sent to Lockheed Missiles and Space Company and Martin Company on January 31. However, I received a TWX today (2/3/67) from MSC (Thompson) that indicates they do not completely see MSFC's integration role the way we do. (See enclosure.) Mr. E. L. Field made a summary presentation to the R&DO Council on February 3 on the Phase "D" guidelines. ✓

L.B. Last time you told me you planned a meeting with Chuck Matthews to get a decision on the questions raised in Thompson's TWX. Has this meeting gone?

ORBITAL WORKSHOP:

R&DO will evaluate the CSM TV system for Orbital Workshop use and compare it with the MSFC proposed system. ✓

A meeting was held on February 1 to discuss the engine dump test at AEDC for Orbital Workshop passivation. It was decided to conduct an ambient dump test at Test Laboratory using LN₂ prior to testing at AEDC. ✓

DAC presented their evaluation of the MSFC crew quarters design at P&VE February 2. DAC had several minor comments - overall the design was acceptable to them. ✓

ATM PRINCIPAL INVESTIGATORS MEETING:

The next ATM Principal Investigators Meeting will be hosted by the High Altitude Observatory in Boulder, Colorado, in February. Agenda items include presentations on spacecraft contamination, system pointing control, experiment packaging, and camera EVA requirements. ✓

DEFENSE PURCHASE REQUEST:

Defense Purchase Request with the Naval Research Laboratory has been modified to include the delivery of subscale models of their ATM S-053 experiment. These models will be flown on Aerobee sounding rockets in early 1969 to obtain in-flight information required to improve the probability of success of the mainline ATM experiment. ✓

Enclosure for Dr. von Braun and Gen. O'Connor only.

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H-1 ENGINE "Eddy current" turbine wheel inspection has been completed on S-IB-206 and S-IB-209 stages. All turbine wheels were acceptable. Schedules are being established for inspection of the turbine wheels on engines installed on the remaining stages (S-IB-205, -207, -208, -210, -211, and S-IB-212).

All turbine rework engines for SA-207 and SA-208 have been returned to MAF for reinstallation in the stages. The four remaining turbine rework engines (spares) have completed hot fire and are being prepared for shipment to MAF. ✓

F-1 ENGINE Three ignition monitor valves (IMV) were replaced on vehicle 501 during checkout at KSC (one for lockup and two for leakage). Analysis of IMV valves revealed that one valve failed because of over pressurization during checkout, the other two valves were found to be in satisfactory condition during post removal checks. Leakage has been attributed to erroneous data obtained due to a faulty pressure regulator. ✓

As a result of EPO Representatives visit last week to Washington to brief the Apollo Application Program personnel on the F-1 Engine Procurement Plan for AAP engines, Mr. Oliver Bumgardner paid us a visit to obtain further backup material on our planning of production support. ✓

J-2 ENGINE The slight thrust shift experienced during vehicle acceptance on the center engine of S-II-501, J-2028, was traced to contamination and partial blockage of the gas generator injector "LOX Safe," a thread lubricant used by S&ID was found in the LOX tank and traces were detected on the LOX pump flange of the center engine. This instigated an inspection of the gas generator and main injectors of engine J-2028 (Position 5) and the LOX inlet ducts of engines J-2026 and J-2035 (Positions 1 and 4). The LOX pumps of the other two engines were also replaced at MTF and no contaminants were found. Sufficient contamination was found in the gas generator injector to explain the thrust shift and one LOX post in the main injector was found plugged with "LOX Safe." Traces of "LOX Safe" were found on the LOX pump inlet flange of engine 1 but not a sufficient amount to warrant hardware disassembly. However, a visual inspection will be made of the injector posts from within the thrust chamber using a high intensity light source.

An "eddy current" test of all titanium pressure vessels has been established by the S-IVB-503 accident investigation board to determine the quality of the weld material. Rocketdyne will remove a section of start tank insulation, perform the test and repair the insulation. The test will be performed immediately on SA-206 and SA-501. ✓

The new 230,000 pound thrust J-2 engines are installed in the S-II Battleship and are being checked out for a transition test on 2-8-67. ✓

The last engine for S-II-507 (the 100th engine) was delivered last week. ✓

NOTES 2/6/67 CONSTAN

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Contract NAS8-5608, The Boeing Company

Supplemental Agreement MICH-310 for S-IC Stages 11 through 15 with a target cost of \$112,000,000 and target fee of \$8,137,500 was approved by NASA Headquarters on February 1, 1967. ✓

Contract NAS8-5606(F), The Boeing Company

Supplemental Agreement No. 23 in the amount of \$1,896,000 which provides for rehabilitation and replacement of facilities was approved by NASA Headquarters on February 2, 1967. ✓

Mardi Gras

All contractors located at Michoud will observe February 7, 1967, as a holiday. The Government will have a liberal leave policy for this date. For all practical purposes, Michoud will be closed this date. ✓

NOTES 2/6/67 FELLOWS

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1. R&D Operations Technical Justification for the Program Operating Plan (POP): Last August, R&DO prepared detailed technical supporting justification for the POP which added substantial visible depth to the Center's planned FY-67 activities. Copies of that "book" were furnished informally by the Executive Staff to NASA Headquarters representatives who indicated later a greater understanding and appreciation for R&DO support to the Apollo Program. The technical support "book" will be updated to clearly show R&DO participation in the FY-68 Apollo Program. This information will be available for support of the next POP submission. ✓

2. R&D Operations Director's Review: The next periodic review of the R&DO organizations by R-DIR is scheduled to begin early in March and to be completed during that month. Planned activities will be related to the numbers and skills of personnel required and available to carry out those plans. ✓

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A LVDA (Launch Vehicle Data Adapter), after being processed through IU checkout and subsequent storage, developed many failures on further testing. The IBM Owego analysis showed that at least 45 printed circuit pages did not meet the specifications due to the resistors changing their value up to 65%. Two mechanisms could cause this - chemical change such as hydrogen reduction of the palladium oxide or a high voltage discharge. For the latter case, the voltage discharge (2 to 3 Kv at 150 nanoseconds for a 65% change) could come from test equipment surges or by a static charge buildup. Since the LVDC also was tested with the same equipment, it is suspected that the static charge was the cause. No other units have experienced this problem and analysis is continuing to ascertain the cause and prevent its recurrence. ✓

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F-1

The calibration test of spare F-1 flight engine S/N F-4024 has been re-scheduled (due to change in date of MSF Subcommittee Hearings) to February 10, 1967. ✓

S-11

S-11-2 was shipped from Seal Beach on January 27, 1967, and should arrive at MTF on approximately February 10, 1967. ✓

POWER PLANT TEST STAND

Two H-1 engine preclude shutdown tests were conducted at the Power Plant Test Stand. P1-491 was conducted January 30, 1967, for a duration of 15.16 seconds. P1-492 was conducted January 31, 1967, for a duration of 15.28 seconds. S-1B flight configuration precludes and associated pneumatic hardware were utilized for these tests. Test P1-492 utilized no pneumatic control orifice in the lox preclude, resulting in the fastest closing time possible with this setup. All engine parameters appeared normal and no damage resulted. These tests concluded the present series of preclude shutdown firings. ✓

S-1B-9

Operations are continuing to prepare the stage for static test SA-42. A thrust OK pressure switch on an outboard engine was found to have damaged pins in the plug connector. The switch will be replaced, along with the engine harness, which was damaged in the attempt to connect the harness to the damaged plug connector. Two inboard engine thrust OK pressure switches were also found with damaged connector pins, but not until after power had been applied. The thrust OK pressure switches are located in a position where the connector is not directly visible or accessible without great difficulty. Upon application of power the propulsion distributor for the inboard engine was damaged. It has been shipped to Michoud for repairs. Inasmuch as the distributors on other stages have priority need, resumption of "power on" checkouts are dependent on repair of the S-1B-9 distributor. Test SA-42 is still scheduled for February 21, 1967. ✓

SATURN V PRIMARY DAMPING SYSTEM

The new design for the hook mechanism utilizing a roller-guide in lieu of the unsatisfactory bushing-rod is due to be received from ME Lab the last of this week. Approximately one week of testing will be required with the damper arm which is now scheduled to come out of the test tower on February 17, 1967. ✓

AUXILIARY DAMPER SYSTEM(ADS)

Testing started on the ADS on January 31. On Saturday, in attempting to manually connect the damper cylinder to a moving vehicle, the hook was damaged. It appears that a stronger hook and the use of a teflon sliding surface on the cylinder guide will correct the problem. No schedule slip is anticipated at this time. ✓

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1. MSFC ADP SHARING EXCHANGE CENTER: In agreement with General Services Administration an ADP Sharing Exchange Center was established at MSFC in June 1966. The purpose of a GSA Sharing Exchange is to use an existing computation center to serve as a focal point for other Government agencies who are seeking assistance for computation. In our particular case, we service the States of Alabama, Mississippi, and the Slidell, Louisiana territory. Government installations in this area make their emergency or overload requirements to us and we in turn try to service them or put them in contact with an agency which can assist them. During the first six months of operation there were 45 requests for services received from other Government agencies. Thirty-three of these were successfully completed, twenty-four by MSFC and nine by other agencies. Reimbursement was received on all except when the dollar amount was insignificant. ✓

2. NASA ADP RESOURCE SHARING SYSTEM FOR COMPUTER PROGRAMS:

The computing centers within NASA are attempting to share computer programs and thus avoid a duplication in programming efforts. With this goal in mind a repository of computer program abstracts is maintained by the Manned Spacecraft Center in Houston. Abstracts of computer programs from all NASA Centers and their prime contractors are included in this master file.

To date, the master file contains over 1600 program abstracts. MSFC leads in the total number of abstracts which have been submitted. MSFC's contribution of abstracts totals almost 700. MSFC has made no requests for programs from the library to date.

An essential part of the NASA ADP Resource Sharing System is determining the total cost savings per year due to resource sharing. No data is available at this time on the cost reduction benefit of the system. ✓

H.A.
Where does
that money
go? Does
it go to
Finance Corp
contractors,
or does
Washington
syphon
it off?

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NOTES 2-6-67 JOHNSON

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Heat Pipe Experiment - Los Alamos Scientific Laboratories will deliver this week a prototype of the heat pipe now planned for test in our experiment #37. Since this experiment is quite similar to one planned for flight by AF prior to midyear 67, we are considering cancelling our experiment in its present form but working out with LASL a flight experiment research program to establish the operating limits on heat pipes. Details of the program would be largely dependent upon results of the LASL-AF experiment (and funding availability). ✓

Crossed Beam Program w/ESSA - Several months ago R-AERO conducted preliminary conversations with ESSA on the possibility of jointly investigating the application of crossed beam correlation techniques to microwave probing to determine water vapor content in the atmosphere. ESSA has now decided to conduct the investigation without active participation (funding) by MSFC; however, we will make available for their use any applicable mathematical techniques already developed and consultation within the limits of Dr. Krause's available time. ✓

Visit by Dr. Kurzweg - Drs. Kurzweg, Deutsch, and Wilson, Mr. Gessow and others plan to visit Huntsville on April 4 thru 6 to review activities of the Alabama Research Institute and the status of their OART programs at MSFC. Dr. Kurzweg would like to meet with you during this period, if possible. ✓ We will arrange a time with Bonnie. ✓

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Voyager Shroud Development Program: During the past week, the first large aluminum honeycomb panel was completed. Utilizing the drawings, tooling, fixtures, and material from the cancelled S-IB/Centaur Shroud Program, we manufactured a curved panel; it is approximately 11' wide by 25' long. Six such panels will form a cylinder 260" in diameter and 25' long. The diameter is that of the upcoming Voyager shroud, the length is about one-half of that required. At first appearance, the panel looks very good and gives us much confidence that we will be able to build the Voyager shroud in-house. In the development program we have scheduled a total of eight panels for the following purposes:

a. Heat Survey Panel (completed) - To verify tooling, bond form fixture, autoclave, and nondestructive inspection devices: R-QUAL will use this first panel to verify the "eddy-sonic" nondestructive testing system which is still in development. The panel will later be segmented in order to perform peel and compression tests on skins, doublers, extrusions, etc.

b. Destructive Test Panel - For R-P&VE to verify the design concept. ✓

c. Panels, Numbers 3 through 8 - Those panels will be built further to train personnel of R-ME and R-QUAL in the manufacture and inspection of large composite structures. The six panels will be assembled to a cylindrical shroud. P&VE will conduct an acoustic test program in support of the Voyager program. ✓

Under the present schedule, the manufacturing program will be completed by the end of this calendar year. ✓

W.K.
→ including the flight articles? Aren't we running the risk of major changes in the spacecraft configuration which may impact the shroud configuration(s)?

B

1. H-1 ENGINE: Routine inspection of H-4073 (of S-IB-7) at Neosho upon return from Michoud for turbine rework revealed the wrong serial number on the gas generator LOX line. Further investigation determined that the gas generator LOX lines of H-4073 and H-4075 were interchanged. When and how this happened has not been determined. This type of occurrence could cause substantial performance changes; however, in this case comparison of original acceptance data and stage static data did not indicate any large changes. Also on H-4073 at Neosho, the first penalty firing to verify turbine rework was cutoff at start because of a fire. The gas generator fuel line was found improperly connected to the engine tapoff point and had leaked fuel under high pressure (950 psi). The connection had passed a 10 psi GN₂ leak check. The seal plate was found improperly installed, rotated so that alignment pins and holes did not mate. The flange bolts had been considerably overtightened, bending the pins and warping the flange to effect a seal at 10 psi GN₂. When and how this happened has not been determined. This occurrence could have had catastrophic results on vehicle static test or launch. Action is being taken to require additional inspection of hardware serial numbers and high pressure connections which can only be checked with low pressure gas.
2. S-IB-6 ENGINE GAS GENERATOR TO BE REMOVED FOR DECONTAMINATION: Inspection of engines on stage S-IB-6 upon erection at KSC revealed fuel contamination in the gas generator combustor of position 2. Source of the fuel is not known and removal of the gas generator for cleaning will allow a detailed inspection of the fuel valve for leakage.
3. J-2 ENGINE - ENGINE CONTAMINATION ON S-II-1 STAGE: During teardown of the S-II-1 stage engine position #5 turbopump for replacement of a cracked turbine wheel, deposits of LOX lubricant were found on the pump inlet flange. Further investigation revealed approximately one cubic inch of the lubricant in the S-II-1 LOX tank. Rocketdyne is submitting an Engineering Field Inspection Request (EFIR) to inspect the GG and main injectors of this engine due to suspected contamination during static firing of S-II-1 as evidenced by unexplained performance shifts. The LOX pump inlets on engine positions #1 and #4 will also be examined during turbine wheel replacement. ✓
4. VOYAGER SPACECRAFT CONFIGURATION CONTROL: Preliminary configuration drawings and weight estimates for both a liquid propulsion spacecraft and a solid propulsion spacecraft concept were generated and distributed to the Voyager Working Group members. These initial drawings were based primarily on concepts presented in the Boeing, GE, and TRW Voyager documents. Spacecraft propellant loadings and structural weights were scaled up to reflect the new 5,000-pound capsule weight. As the Voyager spacecraft design study progresses, these drawings will be updated to reflect the latest design input from the various organizations and will be distributed periodically to insure proper configuration control. ✓
5. MSFC EXPERIMENT NO 2: An orientation presentation on MSFC Experiment #2 was given by division personnel to NASA, IBM, and GE personnel at KSC on January 25, 1967. The flight qualified test panel was shown. ✓
6. S-II-1 LH₂ FEEDLINE DEFECTS: During the inspection of the LH₂ feedlines, defects were noted on the convolute bellows. These defects were in the nature of dents. An evaluation is being made, and some feedlines will have to be replaced. ✓

P.L.
Please ask Bill Brown if I should send this text with a personal letter to Spaulding. (Follow-up to the more general letter he got about a week ago.) Here, as an illustration, is what I have in mind, when I say I'm concerned. Mind you, this is the H-1 now over 10 years old!!!

B
If he agrees ask him to draft the letter.

NOTES MAUS 2/6/67

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Negative Report.

B2/7

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NOTES 3/6/67 RICHARD
2/6 q/s

Appointment of Mr. Frederick E. Vreuls: Mr. Vreuls has been assigned to the Technical Systems Office in the Deputy Director position. His R&D Operations (P&VE) background and his Industrial Operations experience give added balance to our organization. Mr. Vreuls is working the Cluster mission as his priority assignment. ✓✓

AAP Cluster System Specification: The Technical Systems Office, with support from the laboratories, is preparing an AAP Cluster System Specification. ✓ It is estimated that the document will be available for MSFC distribution about February 10. ✓ This document will be used as our "going-in" position on cluster system meetings in Washington later this month. The document will be released, updated and controlled through this office. ✓

B
2/7

1. S-IVB-501 Stage at KSC:

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- o Inspection of titanium ambient helium bottles on S-IVB-501 has disclosed one bottle to be in the out-of-specification weld "suspect" category.
- Action is underway to remove "suspect" bottle and return to SACTO for further test. ✓

2. S-IC-T Stage - Systems Demonstration Test at MTF:

- o First captive firing on new test stand (B-2 position), which has been scheduled for Thursday, 9 February 67, is now expected to occur between Thursday, 16 February 67, and Saturday, 18 February 67. ✓
- o Delay is due to stage/facility interface problems.
- o Installation of S-IC-4 in the Test Stand will be delayed. (Was scheduled for Friday, 17 February 67 - impact is being assessed). ✓

3. S-II-I Stage at KSC:

- o The LH₂ and LOX tanks have been pressurized and the stage was erected in the low bay checkout position on Wednesday, 1 February 67.
- o Modification work is progressing satisfactorily.
- o Forecast High Bay erection: Tuesday, 21 February 67. ✓

4. Launch Criteria Simulation Model:

- o In October 1966, I authorized a 90-day feasibility study by Boeing (SE&IS) for a Saturn V Dynamic Launch Decision Criteria Simulation Model. This model has limited Apollo potential since it could not be operational before about 1970. However, I do feel that the study has considerable merit for future programs. I suggest that a briefing summarizing this study be arranged for you, Gen. O'Connor, Dr. Speer, and Messrs. Newby, Belew, and Williams. ✓

Jim Ship
Please arrange
B

NOTES 2/6/67 SPEER

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1. MTF VIDEO LINK: At the request of Gen. O'Connor, and in coordination with MTF and Management Services we have initiated action to provide video and voice commentary at MSFC from the S-II and S-IC static firings at MTF. This capability is planned to be available by April 1, 1967. We will coordinate plans for its use with all affected offices in the next few weeks. ✓

2. PERSONNEL CHANGE AT HEADQUARTERS: Effective 2/1 (but not yet formally announced) Gen. John D. Stevenson has assumed full responsibility as Director of Mission Operations, OMSF. Mr. Christensen plans to leave for his new position with Lockheed not later than 2/16. Gen. Stevenson was Assistant to Dr. Mueller since 10/3/66. Before retiring from the Air Force he was Commander, Joint Task Force 8 of the Defense Atomic Support Agency. ✓

3. IONOSPHERIC SOUNDING STATION TRANSFER: The Eastern Test Range (ETR) is transferring the Cape Ionospheric Station to the National Bureau of Standards (NBS) in exchange for the NBS site at GBI. ETR will operate the GBI site for Apollo and other programs as required. At the request of R-AERO-Y the Cape station is being transferred to MSFC. NBS has agreed to this transfer and the paper work is in progress. This station is a mobile unit and will be utilized as required both at MSFC and KSC. ✓

F.S.

How is it
staffed? New
spaces needed??

B

NOTES 2-6-67 Stuhlinger

2/6/67

B 2/7

1. RETRIEVABLE COUPONS ON PEGASUS III: Presentation of the experiment to the MSFEB has been rescheduled for February 6. Preparation of this presentation has been done in close cooperation with OART (d'Aiutolo, Novik). ✓
2. PEGASUS III: A combination of attitude and instrument trouble has resulted in above normal temperatures of the power controller of Pegasus III. The data system has been turned off temporarily in hopes that soon the attitude of the spacecraft will change sufficiently to halt the trend of rising temperatures. At present this seems to have helped the situation, and some temperatures are reported to have dropped. ✓
3. OSSA PROSPECTUS REVIEW: Upon request by DIR, R&DO, Mr. Jim Downey is representing this Center at a review of the OSSA Prospectus in Washington. ✓
4. ASTRONOMY SUBCOMMITTEE: The Astronomy Subcommittee of the OSSA Space Science Steering Committee, under the Chairmanship of Dr. Nancy Roman, will hold its next meeting at MSFC (Feb. 8, 9, 10). One of its agenda points will be the establishment of a priority list for potential EMR experiments. It would be greatly appreciated if you could say a few welcoming words to the Subcommittee. Jesse Mitchell will also be present. I'll discuss this possibility with Jim Shepherd and Bonnie.
Bonnie *8h 2/8* *now it is.*

It is not
on my calendar!

B

Scheduled 2/5
Feb. 89 10:30
10th floor
ny

2/6/68

B 2/7

SA-204: The stage contractors are studying the SA-204's condition subsequent to the accident and in light of its long stay at KSC. They will recommend requirements for refurbishment and where the work should be done. GE has microfilmed their redline in-house ESE drawings in order to maintain a set of drawings depicting the configuration of the ESE prior to the accident. This will allow the engineers to continue work on VLF-34 without losing SA-204 configuration at the time of the accident. We are studying the various possibilities feasible for an SA-204 mission with an early launch date. We plan to examine our initial results with Dr. Rees this afternoon. ✓

AS-206: In the last Management Council meeting it was stated that MSC might not be able to support the planned launch date for AS-206 because of the time required to reconfigure the ground network. It was anticipated that this might mean slipping into the month following the planned launch date. With the delay of AS-204, Chris Kraft has announced that he can now support the working date for the 206 launch. ✓

TITANIUM SPHERE WELD PROBLEM: The board investigating the S-IVB-503 incident has decided that a commercially available eddy current meter can be used to safely determine whether an incorrect welding rod has been used on the titanium spheres. We expect their formal report and recommendations for conducting the test this week. We still have the requirement at present to operate with our titanium spheres pressurized to only 25% of the working pressure. This was threatening to give IBM a schedule slip since they could not complete all their checkout at the reduced pressure. IBM also raised a question of the possibility of damage to the memory module and other components from the field of the eddy current meter. They raised the question as a possibility only since they were not familiar with the meter's characteristics. In order to allay their fears, representatives of P&VE, R-QUAL, and R-ASTR made a hasty visit to IBM on Thursday night, February 2, and all concerned agreed that the strength of the meter was so low that we had no problem in its use. While there, they with IBM made an inspection of all titanium spheres at IBM. None contained incorrect welding rods and we were then able to get a waiver from Gen. Phillips' office (Col. James). On Friday, February 3, we informed IBM that they could use full pressure avoiding a schedule slippage. We appreciate the effort on the part of the R&DO representatives as well as IBM. A P&VE-QUAL team also went to KSC last week to begin testing the spheres in SA-501 and 206. DAC inspected the spheres in S-IVB-501 and 206 with the eddy current meter several days ago and verified that one of the spheres in 501 had been welded with the incorrect rod. We knew this previously from documentation. SA-204 will be checked as soon as the investigating board can release it. ✓

NOTES 2/6/67 WILLIAMS

2/6/67

B 2/7

Frank W.

1. Nuclear Program: (Re my notes of 1/30/67, same subject) After further looking into the proposed briefings, I am very concerned that they will be neither beneficial to the Nuclear Program nor to MSFC. Dr. Lucas and I have discussed this matter, and both of us feel that we should have the meeting either canceled or modified considerably (in terms of format and items to be presented). Dr. Lucas and I plan to jointly take steps accordingly unless you have objections. ✓ o.k.

2. Voyager Cost Study: We have completed cost projections for the Voyager spacecraft, Voyager shroud, and vehicle mods for MSFC. These data were reviewed by General O'Connor, Mr. Weidner, Mr. Newby, Mr. Maus, and Mr. Gorman. Based on the Friday, February 3, review, ASO will provide Mr. Newby the various cost options desired as well as backup material and will participate, as required, in meetings with JPL/OSSA on POP 67-1 MSFC inputs. ✓

→ Maybe you would like to attend the Aut at Jackson Flat on Feb 17.
If so, suggest you contact Jim Shepherd.

FEB 13, 1967

2/13/67- 6/1/68

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NOTES 2-13-67
WITH COMMENTS

MR. GORMAN'S COPY

No DEP-A comments

NOTES
file

NOTES 2-13-67 HOELZER

2/13/67

B 2/14

1. NASA ADP RESOURCE SHARING SYSTEM FOR COMPUTER PROGRAMS:

Reference Notes 2-6-67 Hoelzer (Copy attached). Computation Laboratory gets credit for all reimbursements; a customer gives us a funded order; Financial Management Office reports this to NASA Headquarters; and we then bill the customer and he pays us. The funds are then available for computer operations, etc. ✓ S.K.

2. SHIPMENT OF ANALOG COMPUTER: An Electronic Associates Inc., Model 131 R analog computer was shipped to Auburn University, Electrical Engineering Department for use on MSFC research contracts and as a teaching aid. To assure proper operation two of our technicians spent two days at Auburn setting up and checking out the computer. The machine is now completely operational. ✓

3. FORMAL OPENING OF COMPUTATION LABORATORY (TMB) SUB-STORE:

The new TMB Sub-Store in Computation Laboratory, Building 4663, will open unofficially on February 17, 1967. The formal opening, to include a ribbon cutting ceremony, will be held at 2 p.m. on Friday, February 24, 1967. All arrangements for publicity will be handled by TMB. ✓

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This means
Technical Materials
Branch Sub-Store
where the people
from Comp. Lab
can check out
supplies (office).

4. ANALOG COMPUTER DOWNTIME: On or about March 1, one-third of the analog computers attached to the Simulation Branch will be inoperative because of the floor replacement. All users have been notified and have agreed to this down time (Approximately 40 days). ✓

Until the store
opens, Comp. Lab
people have to go
to Bldg. 4249,
Tech Services,
to check out supplies

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NOTES - 2/13/67 - BALCH

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2/13/67
S-IC-T Testing - Because of numerous problems experienced by the new Boeing test organization in completing components testing, it was necessary to reschedule the start of propellant load test to today, 2/13/67. This will definitely impact first static firing, which was scheduled for 2/16/67. No definite new date for static firing has been set, pending evaluation of propellant load test and simulated static firing. S-IC-T Prestatic Firing Readiness Review is scheduled for 2/15/67. ✓

S-II-2 Arrival - The stage arrived at MTF on Saturday, 2/11/67, and was placed in the S-II Vehicle Service Building for depackaging, receiving inspection, and LH₂ tank inspection. LH₂ tank entry has now been made, but inspection is not complete, and no results are available. Installation of stage on the A-2 stand is scheduled for 2/20/67, and first firing is set for 3/25/67. ✓

S-II A-1 Activation - All permanent on-stand, high-pressure gas systems are now available for all GSE interface requirements and checkout. After the turn-over of the main derrick by the Corps of Engineers, now scheduled for today, the only facility system still to be turned over by the Corps will be the LH₂ fill and dump line and barge flare stack. It now appears that the LH₂ system can be turned over by the Corps by 2/18/67 and that cold shock of the LH₂ system can be run on 2/26/67. ✓

Visit of U.S. Congressman Teague - As you are aware, Congressman Teague and his party visited MTF on Saturday morning, 2/11/67, and were given a general briefing on MTF and a short tour of the S-IC test stand and TCC. I believe you will agree that considerable interest was exhibited by the Congressman and members of his party. Your assistance in answering some of their questions was appreciated. ✓

MTF General Support Services for FY-1968 - Request for Proposal covering general support services during 1968 has been completed, reviewed by appropriate NASA, MTF elements, and submittal to MSFC for approval. ✓

2/13/67

PHASE "D" PROPOSAL GUIDELINES:

After talking to Bob Thompson, I talked with Chuck Mathews and John Disher regarding B. Thompson's TWX of 2/8/67. As I understand MSC's position according to B. Thompson, the problem seems to be centered around our position for a strong MSFC integration systems engineering role for AAP cluster and follow-on mission. In the discussion with Chuck Mathews last Thursday, he seemed to grasp the magnitude of the situation and stated he would try to see Dr. Mueller soon relative to his (Dr. Mueller's) position on MSFC's role as integration systems engineering center. Chuck Mathews was in agreement with B. Thompson that we should try to arrive at an agreement on the MDA interface; however, it was recognized a larger issue is at stake. ✓

MONTHLY MANAGEMENT MEETING:

An open difference between MSC and MSFC pervaded the Monthly Airlock meeting at McDonnell when early in the meeting MSC stated they do not recognize such a cluster element as a Multiple Docking Adapter (MDA). As far as MSC is concerned, the four docking ports and cylindrical structure are just a small part of the Airlock.

As at last month's meeting, MSC still plans for MSFC to simply deliver to McDonnell a bare structure so that McDonnell can integrate all equipment into it. MSFC took exception to this philosophy at the meeting. I have informed MSC (Bob Thompson was not there) we should iron out the MSC/MSFC differences outside the environment of our contractors. ✓ We plan to try and work the MDA interface out this week at MSC. I will keep you informed of the outcome. ✓

MULTIPLE DOCKING ADAPTER (MDA):

During a review of the MDA with Mr. Weidner, Dr. Lucas and others, it was determined that the optimum interface plane between the MDA and Airlock should be at the forward end of the Airlock tunnel. We have, therefore, established a preliminary design and ground rules for a "one piece" MDA which are being officially transmitted to MSC, in accordance with direction from OMSF on January 4, 1967. ✓

MANNED SPACE FLIGHT EXPERIMENTS BOARD MEETING, FEBRUARY 6, 1967:

Dr. Mueller was quite concerned that the corollary experiments of the S017-type (now on CSM) be located somewhere on the cluster so that they could be reused in succeeding flights. He (Mueller) wants experiments of this type re-evaluated with details of impact by the March MSFEB. The Air Force withdrew their requirement for experiment D012 (AMU), and offered to turn over the hardware to NASA if we wished to fly it. ✓

ASTRONAUT VISIT:

Astronauts Pogue and Engel visited here on February 9 to discuss the ATM spacecraft layout in connection with astronaut activities and EVA. They also visited the full-scale mockup and roughly performed the types of EVA motions that are expected. ✓

NOTES 2-13-67 BROWN

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F-1 ENGINE An erosion occurred on the inner radial baffle of injector 2062 (Production Support) (Engine 5039) in the same area and manner as that experienced on the injector in Qualification Engine 5037. The injector had about 840 seconds of run time when the erosion occurred. The injector has been returned to Canoga Park for analysis. No change in engine performance was noticed.

Verbal information has been received from Rocketdyne that firm contracts must be placed with Union Carbide not later than 3-1-67 for certain high strength metals including Hastelloy "C" and Rene' 41 to be used in the manufacture of F-1 engines, if schedules outlined in the F-1 AAP Procurement Plan are to be maintained. This requirement changes the F-1 engine lead time from 92 to 100 weeks and makes FY 67 funding for long lead hardware necessary to support the present AAP schedule with F-1 engines. A TWX providing additional details will follow. ✓

J-2 ENGINE The "eddy current" test of the titanium pressure vessels on the J-2 engines installed in S-II-501, is complete and the pressure vessels were determined to be sound. Inspection of pressure vessels on S-IVB-501, S-IVB-206, and S-IVB-204 are awaiting KSC work schedules.

The search for LOX safe contamination (2-6-67 Notes) in S-II-501 engines was completed and all engines are now considered in satisfactory condition.

A successful S-II Battleship transition test was conducted 2-8-67. The test data are presently being evaluated in preparation for a full duration test 2-16-67.

Testing at AEDC has been delayed three days to replace the engine injector. The injector was damaged in the test last week due to an off mixture ratio condition in the augmented spark igniter. The damage is not related to the engine restart problem. ✓

NOTES 2/13/67 CONSTAN

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2/39/68
The U. S. House of Representatives Subcommittee on Manned Space Flight, headed by Rep. Olin Teague of Texas, visited the Michoud Assembly Facility on Saturday, February 11, 1967, for a tour and briefing, as part of a hearing on manned space flight. Other members of the subcommittee on tour were Reps. Jerry Pettis, California; Guy Vander Jagt, Michigan; John Hunt, New Jersey and Bob Eckhardt, Texas. Also accompanying the group was Rep. F. Edward Herbert, Louisiana. Messrs Robert Freitag and Jack Cramer of NASA Headquarters and Dr. von Braun, Dr. Eberhard Rees, Mr. Harry Gorman, Gen. Edmund O'Connor, Mr. Hermann Weidner, and Ray Kline of MSFC accompanied the group. The members of the subcommittee were impressed by the tour of the facilities and by the Boeing and Chrysler briefings.

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NOTES 2/13/67 FELLOWS

KSC's Wind Profile Measurements in Support of MSFC: In response to Brian Montgomery's request, R-OM representatives visited KSC to be briefed by their Program Management Office on present and potential problems with MSFC in regard to obtaining wind profile data. Types of studies, used for illustration where some administrative adjustments might be necessary, were: Jimsphere wind profile measurement, both routine data and prelaunch wind monitoring; high-altitude chaff rockets, 70 to 90 kilometer wind speed direction; Thermosphere NIKE-Tomahawk, diurnal variation and electron density of winds; acoustical wind measuring system; precision optical tracking, laser tracking of first 50 seconds of flight; and ionospheric sounding station. The result of the presentation was that there are no pressing immediate problems, but three topics require discussions very soon to prevent problems. The three topics are: The form in which data requirements are placed on KSC, i. e., memo vs. a standard format; who has the authority to place requirements on KSC; and which studies, if any, MSFC should fund for. Arrangements are being made for Mr. Taiani, KSC Program Management Office, (and others to be invited by Brian Montgomery) to brief and then discuss these topics with R&DO and IO representatives on February 16 at MSFC. ✓

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NOTES 2/13/67 GEISSLER

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1. Saturn V EDS: We are moving into a very intensive investigation of the total Saturn V EDS dynamics problems with the Boeing Company, as we know them now. Since we received necessary structural data relatively recently, we have only limited flight dynamics results, based on these data, available at this time. AERO and P&VE are working together to get the latest structural data into the vehicle dynamic response computer program to perform these studies. These investigations are scheduled to be completed June 1, 1967. Investigations will include any recommended changes to the control system filters, guidance program modifications and required structural modifications to obtain satisfactory warning times. We are also requesting that the failure effects analyses be re-examined to verify or update criticality numbers and possible dynamics type failure modes. ✓

2. Committee for Meteorological Services: Mr. Robert Turner of our Aerospace Environment Division, has been named by Mr. Phil Bolger, OMSF, as the NASA representative to a special committee of the Interdepartmental Committee for Meteorological Services, Office of the Federal Coordinator for Meteorology. Mr. Turner will present NASA requirements for meteorological services and support. This special committee will evaluate the requirements for improved or new meteorological services, as stated by the various individual federal agencies, and combine them as appropriate. The output of this committee will be utilized in the FY-69 Congressional budget cycle. ✓

B 2/14

1. S-IC-2 CHECKOUT: The S-IC-2 stage was returned to this Laboratory February 6, 1967, as scheduled, and final check-out operations have been resumed. The stage is scheduled to be returned to Manufacturing Engineering Laboratory February 18, 1967, for preparation for shipment. ✓
2. BOEING/MICHOUD QUALITY SURVEY: The quality survey of Boeing/Michoud was completed on February 2, 1967. Findings tend to show a need for re-emphasis and motivation of Boeing quality personnel by their quality management, and a need for improvement in the acceptance test procedures for component hardware such as valves. Generally, the survey was considered successful, and no major problems were found to exist. ✓
3. CALIBRATION EFFORTS: The mobile electrical calibration van has completed six months of service performing on-site repair and calibration for Test Laboratory east and west area block houses. This van was placed in service by our Metrology Section during 1966, and together with the pressure calibration van provides a good on-site calibration capability. Calibration continues to be a booming business for us. Workload was up by about 4000 items in 1966, we extended measurement capabilities in the electrical, physical and dimensional labs, conducted metrology surveys at seven major contractor facilities, reviewed calibration procedures for the MTF Calibration Laboratory, performed certification of many MTF Calibration Laboratory standards to establish NBS traceability, and assumed the Astrionics Laboratory calibration function during the last year. As a beneficial by-product of the automatic data system utilized by the Metrology Section, we assist MSFC organizations in locating instruments so that they may borrow from other organizations to fulfill test equipment requirements. ✓

NOTES 2/13/67 HAEUSSERMANN

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1. CONTACT FOR CLUSTER THERMAL PROBLEMS: Mr. F. Brandner has been appointed the Astrionics point of contact for thermal problems on the cluster. ✓

NOTES 2/13/67 HEIMBURG

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S-1C

The preparation for the propellant load test and static firing of the S-1C-T stage by Boeing at MTF was encumbered with instrumentation problems. The propellant load test has been re-scheduled for February 13, 1967, and February 14, 1967. The static firing has not been officially re-scheduled. However, a one week slippage to February 23, 1967, is anticipated. ✓

F-1

Test FW-059 was conducted on the West Area F-1 Test Stand with F-1 Engine S/N F-4024, on February 10, 1967, for a duration of approximately 50 seconds. Primary test objective was to calibrate the engine (S-1C-503 spare). ✓

S-1B-9

Operations are continuing to prepare the stage for static test. Two auxiliary hydraulic pump motors have been replaced because of defective overload switch operation. A gas generator was removed because of excessive LOX poppet leakage and sent to the Rocketdyne local facilities for servicing. The gas generator was serviced and will be re-installed today. Two "thrust OK" pressure switches and the associated electrical cable for one switch was replaced. Test SA-42 is scheduled for February 21, 1967. ✓

SATURN V PRIMARY DAMPING SYSTEM

The re-designed hooking mechanism is due to be delivered to Test Laboratory from ME Laboratory today. The new design incorporates a roller arrangement on the hooks in lieu of the guide rod system. It is anticipated that installation of the new system (including instrumentation) will take about two days and testing the system should take about three days. ✓

NOTES 2-13-67 HOELZER

2/13/67

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1. NASA ADP RESOURCE SHARING SYSTEM FOR COMPUTER PROGRAMS:

Reference Notes 2-6-67 Hoelzer (Copy attached). Computation Laboratory gets credit for all reimbursements; a customer gives us a funded order; Financial Management Office reports this to NASA Headquarters; and we then bill the customer and he pays us. The funds are then available for computer operations, etc. ✓ G.K.

2. SHIPMENT OF ANALOG COMPUTER: An Electronic Associates Inc., Model 131 R analog computer was shipped to Auburn University, Electrical Engineering Department for use on MSFC research contracts and as a teaching aid. To assure proper operation two of our technicians spent two days at Auburn setting up and checking out the computer. The machine is now completely operational. ✓

Technical Materials Branch 2

3. FORMAL OPENING OF COMPUTATION LABORATORY (TMB) SUB-STORE:

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4. ANALOG COMPUTER DOWNTIME: On or about March 1, one-third of the analog computers attached to the Simulation Branch will be inoperative because of the floor replacement. All users have been notified and have agreed to this down time (Approximately 40 days). ✓

NOTES 2-13-67 JOHNSON

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1. MSFEB Meeting 67-1 - At the meeting on 2-6-67 the Manned Space Flight Experiment Board took action on the following experiment proposals concerning MSFC:

a. Hydrostatic Gas Bearing (MSFC # 11) - After recommendation of the Board and approval by the Associated Administrator, Manned Space Flight, the experiment was referred to the Apollo Applications Program Office for implementation on a flight vehicle. ✓

b. Pegasus III Coupon Measurement and Retrieval (MSFC # 50) - The experiment proposal was withdrawn by OART in response to the Board's agreement that the proposed EVA was sophisticated beyond the expected capabilities of the early AAP missions. It will be reviewed by OART and possibly revised for resubmission later. MSFC will conduct the basic work for this review and revision. ✓

c. Surface Adsorbed Materials (MSFC # 42) - The experiment proposal was reported incompatible with the Workshop Mission, if the SLA (Spacecraft LEM Adapter) Panels are retained. However, if the panels are jettisoned, the experiment is compatible. HQ's Flight Program Office, upon request of the Board, will immediately analyze the feasibility of jettisoning the panels. We are studying some possible alternate modes of conducting the experiment. ✓

2. Battelle Memorial Institute Presentation - Mr. D. C. Minton and his staff made a presentation on their capabilities and facilities on 2-9-67. In the afternoon the group toured the Labs and were briefed on MSFC's research work. ✓

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1. S-II Elbow Test: The S-II vehicle has five feedline elbows installed in the side of the vehicle. Cracks have developed in the area where the elbows are welded into the flange. A fix was made: the flange to elbow joint was reinforced with a circle of bolts. Marshall recommended substitution of a stainless steel elbow assembly for the aluminum elbow with the "fix". For a hydrostatic test of the stainless steel elbow, a modification was made to the S-IC-C tank to bring its wall thickness to that of the S-II vehicle. The stainless steel elbow was tested and passed.

Because a replacement of the aluminum elbows by stainless steel ones would cause a schedule impact of several weeks on S-II 5, 6, and 7, S&ID wants to leave the elbows with the "fixes" in these vehicles and to run a qualification test at MSFC on that elbow configuration. For the test an aluminum elbow was received with a 32.5" diameter flange. However, MSFC stress personnel wanted a 42.5" diameter flange so it was agreed to test (a) 32.5" diameter and (b) 42.5" diameter flanges. The aluminum elbow with the 32.5" diameter flange was installed and hydrostatically tested February 3, removed February 4, and sent to inspection for die penetrant check and X-ray. No signs of cracks were noted. The next test of a 42.5" diameter elbow will require MSFC to fabricate two ring doublers for installation of the S&ID elbows. Modification of the elbow flange from a 32.5" to 42.5" diameter has delayed testing for approximately six weeks on the second elbow. ME Laboratory is at present waiting for drawings on the larger ring doublers and receipt of modified elbows from S&ID. ✓

2. S-II Spray Foam Insulation: The current S-II hydrogen tank insulation concept being developed by S&ID involves spray application of polyurethane foam insulation to the outer surfaces of the S-II cylindrical tank section, forward bulkhead, and bolting ring. R-ME is supporting the S-II spray foam development by establishing a development program in-house in which different types of spray equipment and polyurethane foams will be evaluated. Twenty-five test panels have been spray-foamed to date in the development effort. Foam insulation applied with the airless equipment is proving superior in several significant mechanical properties to foam applied by conventional air-atomized spray equipment. In order to determine and optimize the engineering parameters and to define a manufacturing process for application of spray foam on the S-II vehicle, an additional series of 225 test panels and several sub-scale test tanks are scheduled to be spray-foamed. The development program will culminate in applying the best spray-foam materials and processes to a full scale 33' diameter cylinder complete with simulated elbows and with the complex bolt ring configuration. This work will be done on the rotating turntable in the Vertical Assembly Tower. R-ME is targeting completion of the total test program by April 1, 1967. This schedule will support S&ID's application date for the S-II vehicle. ✓

3. Voyager Shrouds: In answer to your question in the NOTES 2-6-67 (copy attached for DIR and R-DIR), the present shroud panels are developmental only and not full size. No flight articles are being manufactured. ✓

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2/13/67

1. NUCLEAR GROUND TEST MODULE: We have furnished preliminary layouts of the service arms to Test Laboratory defining stainless steel line routing, diameters, thickness, and weights. Test Laboratory is to determine impact on the facility if the facility is required to furnish radiation shielding for the service arms. The Research Projects Laboratory (R-RP-N) is working with Test Laboratory in establishing umbilical shielding requirements and verification of personnel accessibility criteria. ✓
2. QUALIFICATION STATUS: Douglas Aircraft Company has completed all mandatory testing required for S-IVB-204 launch milestone. The Ad Hoc Propulsion Assessment Team has made an important contribution to this achievement. Currently, there are two remaining components which would affect the -501 stage launch milestone. These components are scheduled to be completed by March 24, 1967. ✓
3. TITANIUM PRESSURE VESSEL VERIFICATION: The titanium pressure vessels have been checked by the eddy current method, and all bottles and welds have been determined to be 6Al-4V titanium alloy on the following stage hardware: S-IB : 206, S-IC : 501 and 502, S-II : Battleship (by S&ID) and 501, S-IVB : 206 (by DAC) and 501 (by DAC), S-IU : 205, 206, 207, 501, 502, and 503. In addition, vessels have been checked on test hardware in various laboratories at MSFC. Every pressure vessel checked so far has been of the proper parent and weld wire alloy. ✓
4. PROPELLANT LOADING OF AS-503: Excessive residuals will be left on the stage after second burn cutoff because of the mission profile. AS-503 will be loaded the same as AS-504 and subsequent, which is essentially a full load. MSC has required that no disturbances occur from 20 minutes after second burn cutoff to two hours after cutoff. With the present AS-503 load, the MSC requirement cannot be met because (1) more venting will be required and (2) the c.g. will be shifted for the whole mission, which will impact the trajectory and the bending moments of the vehicle. DAC has been contacted concerning this problem and is investigating the possibility of off-loading. A meeting will be held today to discuss the off-loading with R-AERO and Structures Division. ✓
5. DESIGN AUTOMATION WORKING GROUP MEETING: The 18th meeting of the Design Automation Working Group (DAWG) was held at The Martin Company, Orlando, Florida, on February 1 - 2, 1967. The scope of the Working Group, previously limited to the solid propulsion area, is being expanded to incorporate all chemical systems. The primary objective of the DAWG is to make available, to both government and industry, automated tools and techniques for rapid preliminary design and evaluation of chemical rockets and their components. ✓
6. S-IVB O₂H₂ BURNER: Burner S/N 92 underwent a successful 4½ hour burn test on February 3, 1967. Another successful 4 hour test was completed last week. Several successful cross-ignition tests were completed. The slotted injectors are also improving the injector icing problem. No significant problem with icing was noted. These tests were accomplished using an advanced injector design, which will probably fly on the 503 S-IVB Stage. This is the first flight using an O₂H₂ burner. It will be the primary system, with the pressurizing bottle system being retained as back-up for several flights. ✓

2383

AAP POP REVIEW - MSF personnel will visit Marshall on February 14 to review and discuss the Marshall AAP POP submission. They have indicated particular interest in the price-out of the guideline schedule which reflected Saturn V production rates declining to two per year and the rising again to four per year. Our POP submission was, in effect, an alternate proposal with a more smooth production schedule. The Saturn V Office indicates that they have investigated the guideline schedule and will have available estimates for FY 68 and FY 69 for discussion during the review. ✓

RATIONALIZATION OF 4 x 4 PRODUCTION PROGRAM - A draft Policy Paper formulated for Mr. Gorman has been selectively circulated as a guideline for internal studies. Formal paper is due in Washington by March 1, 1967. The objectives of the paper are:

1. Document the Space Objectives approach to support the 4 x 4 production decision.
2. Broaden the base of the Goodrum F-1 and S-IVB study effort to include possible consolidations for all major stage and engine contractors.
3. Produce a contracting philosophy which will force the contractors to formally commit themselves to the cost savings predicted by the studies.
4. Provide leverage for contract negotiations through competition between production and test modes.

This philosophy appears worthwhile even if mode changes are not made since the present mode will be "wrung-out" by the contractor to stay competitive. The actual accomplishment of one or two mode changes such as the F-1 or S-IVB would have a beneficial effect on the leverage. ✓

NOTES - 2/13/67 - RICHARD

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2/13/67

Meeting with KSC: Representatives of P&VE, Aero, Technical Systems Office, and Industrial Operations Saturn V Systems Engineering and Test Offices met with General Shinkle, Dr. Gruene and others at KSC on February 9. We presented the material concerning Saturn V liftoff clearance and ground winds that was presented in the Systems Review on January 26 at MSFC.

Aero also presented some material on worst-case tower environments (pressures and heating rates). We have agreed to examine the nominal flight case as well to help KSC anticipate refurbishment problems.

Several action items came out of the meeting. KSC will give their final concurrence to the amount of the yaw maneuver this week. Both centers will reconfirm the reconnect capabilities of the damper and swing arm #9; and KSC will determine, using MSFC excursion data, the capability of the swing arms to follow a vehicle exposed to 63.2 knots. ✓

2/13/67

1. S-IC-T Stage - Systems Demonstration Test at MTF:

- o Captive firing scheduled for Thursday, 16 Feb 67 is being impacted by numerous problems. New date will be established after propellant load test. ✓
- o Installation of S-IC-4 Stage in MTF test stand rescheduled from Friday, 17 Feb 67 to Saturday, 25 Feb 67, because of late completion of S-IC-T testing, and this may be impacted further. ✓

2. AS-501 Launch Vehicle at KSC:

- o De-erection of vehicle (with S-II spacer) now scheduled for Tuesday, 14 Feb 67.
- o Modification of S-II-1 Stage in Low Bay is approximately 43% complete.
- o Re-erection of vehicle with S-II-2 has been rescheduled from Tuesday, 21 Feb 67 to Thursday, 23 Feb 67.
- o AS-501 rollout still scheduled for Wednesday, 29 Mar 67. ✓

3. S-II-2 Stage:

- o Arrived on-dock MTF, noon, Sat, 11 Feb 67 (on schedule).
- o Expected to be on-dock KSC, Sat, 6 May 67 (on schedule). ✓

4. AS-501 Launch Vehicle Digital Computer (Flight) Program:

- o Final flight program is scheduled to be on-dock KSC, 17 Apr 67.
- o Several hardware/software changes are now being considered on the J-2 engine/S-IVB restart. These changes may further delay completion of the flight program, which could delay launch of AS-501. ✓

5. Relay Contamination:

- o Contaminated relays (manufactured by Union Switch and Signal Co., a Division of Westinghouse Airbrake Co.) have been found in S-IC Stage distributors.
- o There are 56 of these relays in S-IC-1. They are used in the following circuits: EBW, Retro Rocket and Separation; Engine Cutoff; Range Safety Cutoff, and Thrust O.K. Enable.
- o Assessment of impact is now underway. You will be advised as soon as practicable.
- o Contamination checks will be made on similar relays in other Saturn V stages. ✓

1. APOLLO SECURITY MEETING: MSFC, along with KSC, MSC and OTDA, presented the results of the various parts of the Apollo security study to Gen. Phillips. The meeting on 2/9 will be followed by a presentation to the Management Council. The MSFC presentation, prepared and presented by R-ASTR personnel, was well received. Action items concerning MSFC include (1) a re-evaluation of the need for updata to the I. U. during powered and orbital flight for the lunar mission; (2) a study of the most efficient means of implementing a safeguard to the updata system; (3) develop with KSC and ETR adequate procedures for secure handling of command system data. ✓

2. IONOSPHERIC SOUNDING STATION: In answer to your question concerning the staffing of the station: according to R-AERO no new spaces will be required. The station will be used only part time utilizing R-AERO-Y technicians. ✓

3. HOSC ADDITION: The construction effort on the HOSC addition is well ahead of schedule. However, final completion may not be reached before the scheduled date of March 23 due to late delivery of an air conditioning pump. We are attempting to achieve partial beneficial occupancy earlier in order to begin movement of equipment. We expect to utilize our new facilities for the next mission. ✓

4. HOSC BACKUP POWER: Investigations on a backup power supply for the HOSC are underway. We have given F&D an initial estimate of requirements for backup power, on which they will base a short in-house study of alternatives. R-COMP has initiated a more thorough study of power requirements and problems from power transients on which to base final planning. ✓

5. ODOP IMPACT PREDICTOR: Dr. Mueller seems to have agreed to KSC's request for a near pad impact prediction system; however, he is not convinced that our present ODOP system is the best choice. He has requested a new independent study which is being awarded by KSC to TRW. We shall assist KSC as required. ✓

F.S. ✓

But it's there! Anything new
will cost money! B

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1. ATM: From the viewpoint of the Experiment Scientists, the problems of thermal environment inside the ATM envelope (which is of immediate influence on the thermal design of the instruments), and the pointing accuracy of the ATM, are presently the most important ones. It is expected that discussions at this week's meeting with the Principal Investigators in Boulder will result in some progress. ✓
2. PEGASUS RENDEZVOUS: At the MSFEB meeting on February 6, the combined solar-reflectometer and Pegasus rendezvous experiment was strongly supported by OMSF and OART, especially by Dr. Eggers who attended the meeting for Dr. McAdams. Dr. Mueller apparently was well briefed on the experiment prior to the meeting and expressed that he liked it. He ruled out early AAP flights 209 and 210 because the astronauts require more EVA experience for this mission. No flight number has been assigned as yet. We are going to continue the work on the experiment as planned, with ASG money support by Dr. Johnson and supporting research and technology support from OART. ✓
3. EMR: All the members of the Astronomy Subcommittee greatly appreciated your words of welcome. Most of the discussions during the three-day meeting centered around the EMR payload and a review of candidate experiments following my presentation on the subject (copy attached). The Subcommittee, including its Chairman Dr. Nancy Roman, has now fully accepted EMR as a desirable payload effort. Two EMR missions, proposed for flights in 1970 and 1974, will now appear in the plans in the 1967 version of the OSSA Prospectus. The four sample experiments on which the EMR systems design had been based (Friedman, Carruthers, Tift, Gibbons) received very favorable ratings from the Subcommittee. Three were placed in Category I (highest scientific priority and recommended for flight hardware development), and one in Category III (highest scientific priority, but requires some additional technological effort before flight hardware development can begin). Even the Category III experiment (Gibbons, ORNL) will be placed in Category I as soon as the detector system has been successfully tested on a balloon flight in March or April, 1967. The Committee recommended that several other experiments, some of them from the old EO 1 project, should be considered for inclusion in the EMR payload.

You may have noticed that the Final Draft Report of the Joint Space Panels of PSAC, The Post Apollo Space Program, contains the note: "Beyond the S-IVB Project and the Apollo Telescope Mount (ATM), and perhaps the Electromagnetic Radiation (EMR) missions which are planned to utilize backup Apollo hardware already purchased, we recommend". ✓

See Bill Johnson's
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TITANIUM SPHERE WELD PROBLEM: We have received official direction from Headquarters on handling the titanium sphere weld problem. The direction is stated slightly different from the preliminary direction we received. The directive now restricts the pressure limit to 10% of the design burst limit (6,000 to 8,000 pounds) when installed in launch vehicle stages. This limit is to apply to all titanium pressure vessels and propellant tanks made of titanium and using filler welds. The restriction was formerly expressed as 25% of the operating pressure (about 3,100 pounds) for Airtek spheres only. The pressure limitation can be removed after determining that the correct filler wire has been used by means of the eddy current meter. We are changing our instructions accordingly. ✓

REPAIR OF BETA TEST FACILITY: DAC is proceeding with the preliminary engineering studies to identify all facility damage and repairs required to Beta Test Facilities as a result of the S-IVB 503 explosion. IO has recommended to Gen. Phillips that we immediately initiate repair and preparations are being made so that we can immediately begin the facility repair upon receipt of approval. ✓

SATURN IB LAUNCH SCHEDULES: We understand that the Administrator's outlook report was signed by Gen. Phillips for transmittal to Dr. Seamans last week and that it contains the same schedule data as is currently in the Apollo Program Directive 4G. Gen. Phillips was to sign Directive 4G over the weekend. We understand that the new launch dates for the Saturn IB vehicle support the position we recommended to Gen. Phillips in the 204 alternatives letter which you signed last week. The boilerplate 30 payload will be prepared as a backup for later decision. ✓

S-IB-9 DISTRIBUTOR DAMAGE: The propulsion distributor on S-IB-9 was damaged at the static test facility several days ago. Evidence indicates that the problem was created by faulty engine top switches. It appears that these switches were received late and installed after normal checkout at CCSD and were not properly checked. We have investigated and have established that the accompanying documentation was not specific in requiring component testing prior to system verification before static firing. We are taking actions to have this corrected and fuses have been added to the ground test equipment to prevent future distributor damage from bad switches. ✓

NOTES 2/13/67 WILLIAMS

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1. Ed Gray Leaving NASA: I have now confirmed that Mr. George Trimble (Martin Vice President) will join NASA effective April 1 and will replace Ed Gray. Ed plans to have about a two-week overlap, and he will leave about mid-April. There is some possibility that Mr. Trimble's responsibility will be broader than that presently vested in the Gray position; however, the details are not known at this time. ✓
2. LSSM: An Ad Hoc Technical Committee is being established to develop an MSFC technical position for the RFQ to be released around April 1. It is intended that this committee will evaluate study and test data resulting from LSSM studies, MTA and Wheel and Drive test programs. From this data, the committee will assist the SEB in determining how much technical detail should be specified in the RFQ. ✓
3. S-IVB Station Modules: We have completed the initial draft of study plans for the in-house and contracted efforts on the Advanced Spent Stage and ground-fitted versions of the S-IVB Workshop. Present plans are to begin negotiations with the contractor on February 16. ✓
4. Voyager: At the request of Dr. Burcham (JPL), we sent Marshall's first cut at the Voyager Spacecraft and Shroud costs for the 1973, 1975, and 1977 missions to JPL over Mr. Newby's signature. This data will likely end up in the 67-1 POP to OSSA. Marshall has proposed that we meet with JPL and OSSA, as soon as possible, to explain in more detail our numbers since they are higher figures than OSSA has planned presently. Our input would likely impact the FY-69 budget planning. ✓

FEB 20, 1967

NOTES 2-20-67
WITH COMMENTS

MR. GORMAN'S COPY

NO DEP-A COMMENT
MARKED

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S-IC-T Testing - Propellant load test was completed on 2/14/67. The RP-1 fuel was loaded on 2/13/67, and two dry simulated countdowns were conducted. On 2/14/67, LOX was loaded, and a wet simulated countdown was conducted, with an automatic hold programmed at T-10 seconds. Discrepancies from propellant load test are being corrected. Preliminary examination of the test data indicates that the data system is generally satisfactory, though some problems were noted which require correction before static firing. S-IC-T Static Firing Readiness Review was held on 2/15/67, and the static firing of S-IC-T is tentatively set for 2/24/67. Most critical constraint at present is completion of installation and calibration of instrumentation. Further meeting will be held on 2/20/67 to adjust the firing date if necessary. ✓

S-II-2 Testing - LH₂ tank inspection has been completed, and the tank was closed out on 2/17/67. All deficiencies identified have been worked off or dispositioned, and the stage was installed in the A-2 test stand on 2/18/67. LOX tank inspection is in progress and is scheduled to be completed on 2/23/67. First static firing is set for 3/25/67. ✓

S-II A-1 Activation - Delays in installing the insulation for the LH₂ dump line will slip the completion by the Corps of Engineers of the LH₂ fill and vent system to approximately 3/7/67. This is expected to delay cold shock of the LH₂ system to about 3/12/67. Bids have been opened on S&ID fixed-price subcontracts for completing several relatively minor final items of work on the GSE installation. Awards on all these subcontracts are expected to be made by the end of this week. GSE checkout continues and is expected to be completed the first part of March. ✓

S-II Fit-up Fixture - The S-II fit-up fixture (H7-17) is being shipped from KSC to MTF for use in checkout of the S-II A-1 test stand and the S-II Vertical Checkout Building and facilities. It is scheduled to arrive at MTF on 2/21/67. ✓

Gulfport Navy Warehouse - On 2/15/67, the phased schedule was completed on time for moving NASA and Corps of Engineers materials from Warehouse No. 8 at the Gulfport Navy Center to the warehouse at MTF. This closes out all NASA activities at the Gulfport Navy Center. ✓

"Fortune" Magazine Article on MTF - Representatives from "Fortune" magazine were at MTF on 2/16/67 in connection with a proposed article on the Saturn V. ✓

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EXPERIMENT MEETINGS: On Feb. 27 and March 6 at MSFC, Marshall will present the basic ground rules, guidelines, and necessary vehicle descriptions, with emphasis on the relation to bio-medical experiments. The Principal Investigators will then give a summary run-down on the individual experiments and the remainder of the week will be spent in individual experiment working group sessions. At the conclusion of these meetings, we will then have made all the initial interfaces with the corollary experimenters on AAP flights 1-4. ✓

It seems Dr. Mueller has a strong desire to move experiments off the CSM onto other modules in order that the experiments can be reused. MSFC is evaluating in detail the impact of locating the following experiments for operation on the MDA: (a) S009 - Nuclear Emulsion; (b) S017 - X-Ray Astronomy; (c) T004 - Frog Ot lith Function; (d) S018 - Micro-meteoroid Collection; (e) S019 - UV Stellar Astronomy; (f) S020 - UV X-Ray Solar Photography. ✓

ATM MEETING: In the ATM meeting at Boulder, Colo., Feb. 16-17, the Principal Investigators were extremely pleased with our (Mr. E. Noel's of ASTR) presentation on pointing definition and feel that MSFC has gone a long way in solidifying a very difficult area. ✓✓

CLUSTER SYSTEMS INTEGRATION (ENGINEERING): Indications from a meeting at MSC on Feb. 14 between Bob Thompson and myself, along with several MSC and MSFC people (Brooksbank, Hardy, Verble, Vreuls), are that we have a basic Center-to-Center problem on cluster systems engineering/integration responsibilities. Copies of McDonnell documents indicate MSC thinks of MSFC as a structure end contractor to their contractor McDonnell.

It is planned to meet with MSC, KSC and Headquarters on Feb. 23, 24 and 25 to establish cluster baseline agreements and I'm sure we will get into Center-to-Center interfaces. ✓

ATM: The ATM quarterly review was cancelled due to the meeting at Headquarters on Feb. 23, 24, and 25 called by Mathews. It is planned to reschedule in the near future based on availability of Center management and hopefully Mathews' schedule. ✓

ORBITAL WORKSHOP: Astronaut evaluation of MSFC's neutral buoyancy facility (hatches) is now scheduled for week of March 13. Safety procedures for underwater testing are being coordinated with MSC. ✓

L.B.,
Request
briefing on what
we are doing in this
area for AAP
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H-1 ENGINE During pre-static checkout of Vehicle SA-209, a leak was discovered in the gas generator control valve of engine H-7090. The GG control valve was removed and sent to Qual Lab for teardown and inspection. Contamination of unknown substance was found on the teflon seal of the LOX poppet causing the seal to leak. A decision was made to pull and inspect the LOX bootstrap lines and the remaining seven gas generator control valves on this vehicle. ✓

J-2 ENGINE The S-II Battleship was successfully fired for 357 seconds last Friday afternoon. This was the first long duration mainstage test of 230K engines in the S-II cluster. ✓

During receiving inspection of two batches of LOX turbine stator blades, it was discovered that 57 out of 220 were of the wrong material. The material was N-155 (20% cobalt, 20% chromium, 20% nickel and 40% iron) instead of Stellite 21 (60% cobalt, 20% chromium, 20% nickel). These blades were from Austenal, who provides blades for the hydrogen turbine rotor and stator and for the LOX turbine stator. Union Carbide provides blades for the LOX turbine rotor. All LOX turbine rotor blades have been X-rayed in conjunction with the total investigation of Union Carbide and found to be of the proper material. A review of X-rays of all blades from Austenal is currently being conducted. To date, this review has covered all blades received from Austenal since June 1963. Density of all these X-rays is consistent; so it appears that no incorrect blades were installed in engines. However, an engineering analysis is being made to determine if N-155 can withstand the loads imposed upon it in both the LOX and hydrogen turbines in case we find it has actually been installed in some turbines.

The initial test of a 4-test simulation period at AEDC February 18, 1967, was terminated when power was lost to the ignition phase and mainstage solenoid circuitry. Initial indications are that a transistor failed in that particular circuit of the ECA. The terminated test was the first test with heater blankets installed on the engine to produce the predicted 501 thermal environment. The engine was heated asymmetrically with temperatures at one location on the throat at 400°F and one location at the exit at 375°F. There was no indication of fuel pump stall and the engine was well within start parameters. ✓

F-1 ENGINE GSE lines supplying gaseous nitrogen to the S-IC stage and F-1 engine LOX dome and gas generator LOX injector purge system failed during the ground purge leak and functional test on S-IC-1 at KSC. Inspection of the failed lines at R-QUAL revealed that approximately 14 of the 18 metal chips broken from the convolutes in the lines were missing. These metal chips range in sizes up to 3/4 of an inch long to 1/4 of an inch wide. There is a good possibility that some of these metal chips may have been deposited within the engine system. Recommended corrective action on the engine system is being studied. ✓

Impact on the SA-501 schedule is dependent upon the degree of inspection and cleaning required. ✓

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FEBRUARY 22 - REGULAR WORK DAY AT MICHLOUD

Although Wednesday, February 22, 1967, will be observed as a Government holiday, all contractor personnel at the Michoud Assembly Facility will be on a regular work schedule. To cover the operation on this day, NASA will maintain adequate coverage in the Quality area; minimum coverage in other areas. ✓

NOTES 2/20/67 FELLOWS

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Saturn V Damper System A-frame Possible Freefall: In response to KSC's request for additional information about the Saturn V damper system A-frame hoist system, a meeting was held with KSC representatives at MSFC, February 13, to respond to the indicated KSC concern. MSFC was represented by R-P&VE, R-TEST, R-ME, R-ASTR, IO, and R-OM. KSC seemed to think that the A-frame hoist system might fall due to cable or winch failure, and there is no backup for either item to prevent possible damage to the space craft. Three potential systems for preventing freefall of the A-frame on ML-1 for AS-501 were described by P&VE, although it has now been determined that none of these can be manufactured in time to support AS-501. The three systems were: Step counter weight; use of existing counter weight tube as a cylinder with a piston on the cables; and a safety clamping device on the cables.

A hydraulic cylinder system for preventing freefall and for use as a redundant hoist will be available for AS-502. Mr. Murphy, I-V, agreed with the R&DO recommendation that the system be used "as is" for AS-501. KSC representatives were unable to accept the MSFC recommendation on the spot and requested additional information. R&DO has provided IO a summary of the material presented in the February 13 meeting and additional test data requested by the KSC representatives. A followup MSFC meeting has been called for Thursday, February 23, by Dr. Rudolph. He has invited Dr. Rees, Mr. Cook, Dr. Lucas, Mr. Heimborg, and Mr. Kuers for further discussion of the A-frame hoisting system. ✓

2/20/67

1. Saturn V Inflight Acoustics: In response to a request by Dr. Rudolph, for a decision on the 507/508 inflight acoustic instrumentation proposals, submitted by S&ID and DAC, a meeting was held between R-OM, ASTR, P&VE, and AERO. It was decided to recommend to IO, to accept only the DAC, S-IVB proposed package, which covers about 2/3 of the information for about 1/4 of the total cost (about \$500,000). This would eliminate data on unsteady loads on the S-II forward shoulder where structural fixes were provided in view of high loads anticipated. The decision to beef up this area appears to be well justified in the light of some preliminary results from the AEDC 4% Saturn V acoustic model tests recently performed, which exceed the environmental estimates just slightly. However, there are some other areas where the AEDC tests predict aerodynamic noise loads exceeding the environmental specifications significantly. For example, at the I.U., 170 db have been measured versus 153 db originally estimated. Some evidence of increased flight loads has been obtained from S IB flights, but frequency limitations of data acquisition system cut out a major portion of acoustic spectrum at low frequencies. Revised Saturn V Inflight Acoustic Environment will be issued soon and furnished to P&VE for studies of the impact upon the airframe and I.U. ✓

2. Project Odyssey: On February 15, 1967, Northrop presented the first program review relating to the current Odyssey Phase A and B Project Definition, which has been under study since December 1966. The task we assigned Northrop is to develop existing experimental concepts, which will define free molecular and transitional aerodynamics, surface-gas molecular interaction on various Saturn-Apollo materials, atmospheric density in the 160 to 200 km regions, gravitational harmonics, and to improve geodetic knowledge. We intend to study the potential development of a single concept such as a "bus" configuration equipped with propulsion and stabilization systems. This configuration would place the experiments in their required elliptical orbits after ejection from a Saturn launch vehicle. Interest in this program by the scientific community has been excellent. Several well known authorities in the fields of low density aerodynamics and geodetics, with whom we have had close working relationships, participated in our first program review. They are: Dr. Roy Chuan, Celestial Research Corporation; Mr. George Carignan, University of Michigan; Dr. Richard Oman and Mr. Ken Forman of Grumman Aircraft; and Dr. Charles Lundquist of the Smithsonian Astronomical Observatory. Dr. Smelt, chairman of the NASA Research Advisory Committee for Space Vehicle Aerodynamics, has expressed a strong interest in this program. ✓

E.F.

K has read this again
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1. TITANIUM PRESSURE VESSELS: All titanium pressure vessels in the Huntsville area, except for the S-IVB Dynamic Stage, have been checked to determine that the correct welding wire has been used. These checks include the IBM Huntsville facility. A total of 63 pressure vessels were checked. All were determined to be acceptable, and action has been initiated to lift the restriction on pressurization to 25% of working pressure, which was imposed by NASA Headquarters upon recommendation of the S-IVB-503 Accident Investigation Board. Prime contractors have initiated testing of all titanium pressure vessels in plant and on their respective stages in the field. To date, no defective vessels have been found other than those originally identified on the S-IVB stages by the Accident Investigation Board. ✓
2. S-IVB PROGRAM: Our requirements concerning reverification of the S-IVB-208 stage after explosion of S-IVB-503, are being complied with. The stage has been moved from test stand B1 to the VCL and is undergoing complete stage alignment, visual inspection, ultrasonic checks, leak checks, and relief tests of both tanks in addition to normal post static checkout. Post-static checkout is limited at present due to shortages of the new configuration of bussed connectors.
 - o The S-IVB-502 turnover meeting showed that some 6500 hours of rework and modifications were performed after post-static checkout. This work negated any confidence in the flight readiness of the stage gained through post-static checkout. The scheduled shipping date to KSC is February 21, 1967. ✓
3. UNSATISFACTORY CONDITION REPORT (UCR) SYSTEM: We are now receiving automated UCR data from CCSD at Michoud. From the first tape sent, there have been no problems with inserting this data into the MSFC UCR system. Evaluation of the data itself is in process and so far it appears to be acceptable. ✓

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1. LAUNCH VEHICLE DATA ADAPTER - RESISTOR CHANGE. (Reference Notes 2/6/67 Haeussermann, copy attached). In a review on 2/15/67 with IBM-Owego personnel (with Mr. Art Cooper participating), the most probable cause for the resistor change up to 60% was given as electrical discharge. I did not find this explanation satisfactory and I am quite alarmed about the matter. Mr. Cooper, who is also alarmed, has agreed that IBM and MSFC should assign additional personnel to further investigate the causes for the resistor change such as the possibility of a chemical reduction of palladium oxide. Dr. C. Pschera (P&VE), Dr. A. Holloday (ASTR), and a man from QUAL will go to IBM-Owego on 2/27/67. ✓

2. ATM. We have reassessed our in-house capacity to design and fabricate hydrogen-alpha telescopes for ATM and are proposing to the IO ATM Project Office a modified approach to the situation.

Two significant factors have been recognized since we committed to Harvard College Observatory to provide hydrogen-alpha telescopes through in-house effort: (1) direct experience in implementing the GSFC X-ray telescope in-house has sized the magnitude of this type work to be beyond that originally anticipated and is over-taxing our capacity; and (2) examination and testing of a borrowed hydrogen-alpha birefringent filter, designed for ground observatory use, indicates such units must be "space hardened" for application to ATM.

We are considering, therefore, to advertise the hydrogen-alpha telescope design and fabrication to obtain the experience of qualified optical contractors. We will retain the efforts for the TV and photographic camera portions of the telescope and do the maximum work in these areas in-house. Further detailed discussions with Mr. Ise are scheduled this week. ✓

3. MOD II SWITCH SELECTOR. As a result of our "soft spot" single failure mode investigations, we have detected a failure possibility on the Mod II Switch Selector when the output is overloaded or shorted to ground. Tests were performed with another type of transistor. Initial results of these tests have shown promise in resolving the existing problem. A meeting will be held with Saturn IB and Saturn V Office February 28, 1967 to define the task to IBM for the fastest solution to remedy the present shortcoming of the Mod II Switch Selector. ✓

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F-1

F-1 engine S/N F-6049 is scheduled to be installed in the West Area F-1 Test Stand next week. ✓

S-1C

A propellant load test was performed on the S-1C-T stage at MTF by Boeing February 13 and 14, 1967. The static firing is scheduled for February 24, however, this schedule will be assessed in a special meeting today at MTF. The S-1C-4 stage delivery to MTF from Michoud has been delayed until about mid-March due to contaminated relays that must be removed, cleaned and replaced. ✓

S-1B-9

During normal preparations for static firing stage S-1B-9, the gas generator from engine in position No. 1 leaked to the extent that re-servicing was necessary. During that operation unidentifiable solid particles and red dye foreign matter were discovered on the lox poppet valve. No effort, however, was made to identify these substances. The gas generators from the remaining engines were then removed and examined. Information obtained from the engine manufacturer explained the red coloration to be from a lox compatible dye penetrant used in spot checking poppet valve for teflon insert bonding. During re-servicing of the seven gas generators, all except that from position No. 4 were found to be free of particle contaminants. The gas generator from position No. 4 was found to have a "large" metal particle on the lox poppet tapered shoulder. Had it lodged on the seating surfaces, it could have caused leakage. It was sent to R-P&VE for analysis. The lox bootstrap lines were removed and sent to R-QUAL for contamination analysis. No contamination was found. All gas generators and lox bootstrap lines have been replaced on the stage. Test SA-42 is now scheduled for February 24, 1967. ✓

PRIMARY DAMPER SYSTEM

The re-designed roller hook mechanism was received on February 13, 1967. All tests have been successfully completed except the structural test, which is to be completed today. Interference exists between the "Q" Ball Cover removal system and the damping arm. A fix is being coordinated with R-P&VE and KSC. It is presently planned to remove the arm from the tower tomorrow, February 21, 1967. ✓

AUXILIARY DAMPER SYSTEM

A hook locking mechanism was damaged on Saturday, February 19, 1967. A stronger spring to speed up reaction time will probably solve the problem. Testing is scheduled to be completed on February 23 1967. ✓

NOTES 2-20-67 HOELZER

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1. THIRD GENERATION COMPUTER PREPARATION:

Program conversion is continuing with approximately 45 hours of 1107 time having been used for this purpose, out of 1000 hours allowed under the third generation contract with UNIVAC Division of Sperry Rand Corporation.

UNIVAC reports its software development to be on schedule in accordance with the contract. Six of the nineteen sections of the Executive program are reported to be complete.

UNIVAC has requested permission for substitution of medium speed for high speed Data Communications Terminals at remote stations throughout Phase I and, in some cases, until Phase IIB (January 1, 1968). This request has been studied and found acceptable based on UNIVAC assurance that additional medium speed terminals will be provided, if needed. ✓

2. THIRD GENERATION COMPUTER MANAGEMENT PRESENTATIONS:

Presentations covering the third generation concept, plans for implementation and UNIVAC 1108 description have now been given to all laboratories and offices of R&DO, and to all IO staff offices requesting the presentations. Twenty-six presentations have been given and no others are planned. ✓

NOTES 2-20-67 JOHNSON

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Nothing of significance to report.

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Electron Beam Welder:

The use of electron beams for welding has great advantages in that the molten zone is extremely narrow, the weld typically exhibits no porosity, the heat effected zone adjoining the weld is narrow, thick plates can be joined in a single welding pass, and many materials that cannot be welded otherwise can be joined in this manner. Because the energy input is small, distortion in the resulting weldment is much lower than in other kinds of welding. Owing to physical characteristics of the weld, the resultant weld joint is much stronger than, say, TIG or MIG welds. ✓

The major disadvantage in the application particularly to large structures is that hitherto electron beam welding has had to be performed in a vacuum chamber. Significant technological advances have been made in R-ME funded, Westinghouse Electric Corporation conducted, out-of-vacuum electron beam welding system development and weld application study. Narrow low energy welds have recently been produced for the first time in this program and with an energy input only slightly higher than under the standard in-vacuo conditions. The welds were X-rayed and found to be virtually free of voids. The weld joint efficiency is reflected by the average ultimate tensile strength of 48,000 psi for a weld in 2219 alloy aluminum (the ultimate tensile strength in the parent material is 59,000 psi). The recent improvements which led to this success were obtained by improving the shielding gas (helium) flow around the emerging electron beam and around the penetration bead and also by decreasing the gun to work distances. It has also been demonstrated that as the electron beam energy and the weld speed increase, the process becomes more efficient and, in fact, the best welds so far have been made in 1/4" thick material at approximately 250" per minute, with an energy input of approximately 10 KW.

The prototype gun is still at the Westinghouse Laboratories, but we propose to bring it to R-ME for further evaluation within the next three months. At that time I shall inform you so as to give you an opportunity to witness its operation. ✓✓

2/20/67

B. L.

1. INVESTIGATION OF PROBLEMS ON H-4073 CONCLUDED (REFERENCE NOTES 2-6-67):

Two problems on H-1 engine H-4073 (of S-IB-7) reported previously - accidental interchange of gas generator LOX lines with another engine, and improper connected gas generator fuel line. All 8 LOX lines were removed at Michoud after stage static test to investigate LOX dome damage encountered on other stages during LOX line removal. It is likely that the two lines were interchanged at this time due to stage rotation or misreading of engine numbers tagged on the lines. Circumstances surrounding improper connection of the gas generator fuel line seal are more difficult to establish. Michoud reported that correct procedures were followed in preparing the engine for shipment to Neosho. Neosho reported that the connection in question was not disturbed before hot firing of the engine. This conflicting information makes it impossible to establish the cause. The incidents reported are just some of the many human error problems we are encountering in our programs. They are not confined to one company, and in our specific "Note" it was apparently not Rocketdyne's fault but the follow-on contractor's. It appears that we are confronted with more relaxed attitudes toward awareness of the criticality of having everything perfect in our launch vehicles.

2. MULTIPLE DOCKING ADAPTER STATUS: P&VE initiated R&DO planning for in-house design, manufacturing, test and checkout of the MDA upon receipt of a letter from John Disher, Deputy Director, SAA, dated Jan. 4, 1967. The Director of R&DO officially assigned P&VE as lead laboratory for the MDA. A formal RDP is being prepared. The established structural arrangement and basic configuration consist of a cylinder docking adapter cantilevered to the airlock module. A layout of the internal configuration of the MDA defining experiment package location and cutout requirements for vents and other feed-throughs has been prepared. Available materials are being utilized where possible, and weld lands sufficient to preclude extensive tooling are being adopted to permit R-ME to proceed without delay. Present schedules are as follows: (a) MDA Mockup - Apr. 15, 1967, (b) Vibration and Structural Test Unit - Nov. 27, 1967, (c) MDA Simulator to MAC for MDA/Airlock System Test - Nov. 17, 1967, (d) MDA Flight Unit - March 15, 1967, (e) Advanced release for tool design and procurement - Apr. 3, 1967, (f) Advanced release for fabrication - May 21, 1967. We are proceeding as if MSFC and MSC agreed that MSFC has the systems responsibility for MDA; however, there is not agreement between the Centers in this instance.

3. THERMAL CONTROL PROBLEMS: In a recent presentation to you on IU Environmental Control System Problems, discussion also covered thermal problems of the ATM. You requested a special group and a "responsible person" for vehicle thermal matters. The responsibility for vehicle thermal matters has been for many years assigned to P&VE, specifically the Fluid Dynamics and Thermodynamics Branch of Propulsion Division. This is one of our major disciplines, as are Structures, Propulsion, and Materials. We are working all thermal problems to the best of the ability of the limited number of personnel available in this ever-growing responsibility (we reported our problems in earlier "Notes"). Mr. Charles Wood, Chief of the Branch, is the person responsible for vehicle thermal matters. Key personnel of the Branch have the following specific assignments and others are being identified as required: J. Cody, Asst. to C. Wood in overall cluster problems; W. Randolph, Orbital Workshop, Experiments & CSM; G. Hopson, ATM, LM, Airlock. Engineering personnel in the Branch are supporting these key people in addition to any available contractor effort we can find (Chrysler, DAC, Martin, Lockheed, Ball Brothers, Brown Engineering). The above named persons are also considered to be our Panel or Subpanel Chairmen for Inter-Center coordination, if and when these panels are agreed upon by MSFC and MSC.

4. TITANIUM PRESSURE VESSEL VALIDATION: Apparently, NASA Headquarters has alerted DOD to our situation, and we have received several requests for our NDT technique from the A.F. Additionally, we have been in constant contact with MSC and participated in their contractor review of the problem impact.

There's also the complex interface between attitude constraints, RPS fuel requirements, internal power + heat dissipation shadowing by solar batteries, — all of which affect the thermal problems. (hope vaults new coordinates this)

B. L.
See Below
Meeting
J. Matthews
and Thompson
in Feb
3 and 24
will settle
this matter

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NATIONAL LAUNCH VEHICLE SUMMARY PUBLISHED JANUARY 1967 - As requested by Dr. Rees, we have reviewed the possibility of getting the Saturn IB with sholid strap-on's included as a configuration in the National Launch Vehicle stable. Col. Tier, Frank Williams and I agree that it would be very difficult to have the Saturn IB included for the following reasons:

1. There is no firm NASA mission existing to justify the configuration.
2. Based on MOL requirements the Titan III M has recently been included although not yet formally approved.
3. The next issue of the document might not be circulated for another 3 years.

Since the Saturn IB improvement study results were introduced into the Congressional Record via a Chrysler presentation to Congressman Teague, the fact that this configuration is being considered will be recognized. ✓

PSAC REPORT ON POST-APOLLO - We have received the final PSAC Document and reviewed it for changes. We find that all "recommendations" made in the draft are still in the final document, verbatim. Some changes have been made in the supportive reasoning and of those changes, with one exception those submitted by Milt Rosen to Dr. Golovin are incorporated verbatim. The one exception would have changed the statement, "Production of the Uprated Saturn I might well be terminated in favor of lower cost Titan III/ MOL combination for lower E. O. manned missions." ✓

APOLLO FUNDING FOR FY 67 and FY 68 - We have received informal information on an adjustment to MSFC Apollo funding resulting from a review of MSFC POP 67-1 by General Phillips. The contemplated reductions are \$43 in FY 67 and \$88M in FY 68. against the requirements which Marshall stated in POP 67-1. It is expected that this subject may arise during the Executive Session of the Management Council at KSC on February 21, 1967. ✓

H.M.

Our priced-out soft-spot review is designed to give us maximum protection in this area. Ed O'Connor has the details on this review (to be held with GEM) B

NOTES 2/20/67 RICHARD

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Cluster Specification: The cluster specification is almost concluded. Final inputs are expected today (Feb. 20). The theme of the specification is to tie down cluster hardware requirements which focus on interface requirements to be implemented by the panel organization now being formed. ✓

Saturn V: We are now at a point in AS-501 where detailed integration of efforts at MSFC and MSC are necessary to meet schedules and still keep the system updated. This is similar to the activity that was necessary during the final preparations of AS-201.

Such items as the yaw maneuver, engine restart sequence changes, alternate flight modes for engines-out on the S-II, etc., have to fit into the KSC testing cycle properly and still receive proper MSFC verification. We are working closely with KSC to keep our activities tied together. ✓

NOTES 2/20/67 RUDOLPH

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1. AS-501 Launch Vehicle at KSC:

- o Vehicle (with S-II spacer) was de-erected on Tuesday, 14 February 67. ✓
- o Re-erection of vehicle (with S-II-1) is scheduled for Thursday, 23 February 67. ✓
- o A flexible, bellows type, purge line (a facility item on the LUT tail service mast) has cracked and broken open in numerous places. ✓
- o Metal particles may have entered the S-IC-1 stage tubing and the F-1 engine LOX dome and LOX gas generator purge systems. ✓
- o Degree of contamination and impact are being determined. ✓

2. Relay Contamination:

- o Last week it was reported that there were 56 contaminated relays (mfg by Union Switch and Signal Co.) in S-IC-1.
- o Checks on other Saturn V stages indicated:
 - no relays of this type on S-II and S-IVB stages
 - only 4 relays of this type in the IU stage and 5 in the LVGSE ✓
- o All relays of this type in critical applications will be replaced. ✓

3. S-IC-T Stage - Systems Demonstration Test at MTF:

- o LOX loading was successfully completed Tuesday, 14 February 67 and captive firing is now expected on Friday, 24 February 67. ✓

4. Payload Increase - a commitment was made to Gen Phillips on Thursday, 16 February 67, to carry a 98,000 lb payload on AS-504 and subsequent vehicles. ✓

5. Titanium Welding:

- o S-IVB-503 Investigating Board indicated pure titanium welding was weaker than titanium alloy welding. ✓
- o MSF has questioned the applicability of these findings to the thinner wall spacecraft propellant tanks which were welded with commercially pure titanium. ✓
- o MSF has requested MSC, MSFC and the respective contractors to make a thorough review of titanium welding immediately. ✓

NOTES 2/20/67 SPEER

2/20 JS

B
2/23

1. GEN. STEVENSON VISIT: The new OMSF Director of Mission Operations has tentatively accepted my invitation to come to MSFC on 3/2 for a series of briefings and discussions concerning our mission operations activities and problems. In addition, he requested a special briefing on MSFC's meteorological research; this is being coordinated with R-AERO. ✓

2. AS-501 FLIGHT DYNAMICS ABORT LIMITS: MSC presented their current planning on flight dynamics abort limits for AS-501 at the Flight Limits Subpanel meeting on February 14. These limits are primarily designed to insure recovery of the spacecraft at any point in flight, and are very similar to the ones agreed to by MSFC and used on AS-201. A few new limits apply due to the orbital restart mission. Questions are also being raised in connection with the S-IVB early staging command if the limits should be approached during S-II flight. In view of the importance of launch vehicle objectives on AS-501 and the limited new data to be obtained by recovering the spacecraft early in the mission, we need to carefully re-assess these limits for AS-501. We are discussing this with I-V and R&DO and will take necessary action to insure that the AS-501 mission rules adequately protect our objectives. ✓

NOTES 2-20-67 Stuhlinger

2ho JLB

B 2/22

1. ATM REVIEW MEETING: A two-day review meeting of the ATM project was held between members of OSSA, MSFC, and MSC, the PI's, and Ball Bros. Major attention concentrated around the thermal design of the ATM which is the pacing element for the final design of several of the optical instruments. The problem of contamination was discussed at some length by SSL and members of Ball Bros. Research Corporation. It appears highly desirable that materials subject to outgassing be avoided at least in the ATM and the rack and possibly in all other components of the cluster. A wide variety of materials produce harmful deposits on optical surfaces as a result of outgassing. Silicones and plastic foams are particularly troublesome. Members of SSL are in close contact with Dr. Newkirk (High Altitude Observatory), Dr. Tousey (NRL), G. Bonner (MSC), J. Hamilton (MSC), and D. Forsythe (OSSA) in an effort to define and carry out early Apollo flight experiments aiming at experimental contamination data. This effort is a segment of our contamination program consisting of theoretical, laboratory and in-flight investigations. ✓
2. METEOROID HAZARD FOR WORKSHOP: Personnel of Space Sciences Laboratory are working with personnel of P&VE to define the meteoroid hazard and meteoroid bumper requirements for the Orbital Workshop. P&VE has asked Mr. Naumann of SSL to participate in a briefing this week to Dr. Rees on the subject. Mr. Naumann will use results from SSL Pegasus data evaluation, SSL theoretical studies, and from recent SSL hypervelocity range experiment. ✓
3. CHARGED PARTICLE SHIELDING PROGRAM: Art Reetz and Warren Keller from OART visited SSL on Monday and Tuesday. The first day they reviewed the radiation shielding work being performed in the Nuclear and Plasma Physics Branch of SSL. The second day, we were joined by representatives from Langley, Lewis, MSC, JPL, and Bellcomm to discuss the overall NASA space shielding program and to swap information on our various projects. Art Reetz has decided to transfer the direction of the ORNL charged particle shielding program from Headquarters to the centers: the experimental work (\$170K) to Langley and the theoretical work (\$280K) to MSFC. Our guideline funds will be increased accordingly. Martin Burrell will assume monitorship of the Oak Ridge efforts. ✓

B
2/22

NOTES 2/20/67 TEIR
2/20/68

SA-204: The spacecraft was removed from SA-204 last Friday, February 17. KSC plans to remove the service module today and we expect to regain access to the missile shortly thereafter. KSC estimates it will take approximately 13 days to inspect and check out the launch vehicle to bring it up to the Plugs-In test condition as it was just prior to the accident. We plan to then place the missile in a storage condition on the pad until we are ready to launch. The contractors have completed their assessment of necessary actions to store the missile and refurbish it on the pad. At a meeting last week between our stage people and R&DO personnel we decided that to maintain the missile in storage on the pad was our best course of action. We expect that about two months will be required to remove the launch vehicle from storage and prepare it for launch. ✓

ULD RESISTOR DRIFT PROBLEM: (Reference is made to Dr. Haeussermann's notes of 2/6/67) The ULD (LVDC/LVDA - unit logic device) resistor drift problem is becoming more significant. After the LVDA assigned to IU-502 developed multiple failures during a thermal cycling test, this test was run at KSC on the LVDA assigned to IU-206 and the unit failed the test. This unit is being sent back to MSFC for failure analysis. It has not been determined if failure was due to resistor drift. The spare available at KSC will be used assuming it passes the test. This leaves 206 and 501 without a spare at KSC. The condition is further complicated because the LVDA being utilized in program debug (IBM Sim Lab) is also experiencing multiple failures. A meeting was held at Astrionics with Art Cooper (IBM Vice President) in attendance and I feel that proper attention is being given the problem. Failure analysis is continuing. The two most logical causes are static discharge and Paladium Oxide reduction (resistor paste chemical alteration). Pros and cons for both theories are inconclusive. ✓

2/20/67

B 2/23

1. Voyager: In order to obtain as much information as possible from previous Voyager spacecraft work, we had a group from JPL and some of the spacecraft study contractors here last week for briefings and discussions. A Langley team will come to MSFC on March 14 to discuss their experience with the Lunar Orbiter project.

We have submitted task descriptions to JPL, requesting release of \$1M in remaining FY-67 Voyager funds. These funds will allow us to get started on some spacecraft propulsion testing, science/experiment studies, Saturn V/Voyager wind-tunnel work, and a few other tasks.

Inhouse studies of both the shroud and spacecraft are in progress, with all laboratories participating. Status will be reported to you in briefings later this month. ✓

2. MIMOSA: Mr. Woodcock and Mr. Dave Paul attended the MIMOSA presentation at Houston on February 15. About 15 MSC people attended the presentation including Bill Stoney and Andy Meyer who is lunar advanced systems chief under Stoney. Discussions with Stoney, et al, following the presentation indicated that MSC will develop the operational capability to run the MIMOSA methodology. They are not necessarily completely sold on the study conclusions but feel that the technique has application to their lunar planning. We have agreed to support their efforts to make the system operational at MSC. ✓

3. Space Taxi and Space Manipulator Study: The briefing requested by MSC on MSFC's Space Taxi and Space Manipulator study programs (LTV - Argonne Nat. Labs.) has been scheduled for February 27 at MSC. MSC has exhibited considerable interest in these programs in recent weeks. ✓

4. Expandable and Modular Structures Technology: The Air Force (WPAFB) has submitted to MSFC advanced development program plans on "Expandable and Modular Structures Technology" for our review. They apparently need NASA interest to sell this program as part of their budget request. Politically, this matter will be handled very carefully because (1) it has potential long-range impact on NASA plans in this area, and (2) the Air Force has been previously accused by OMSF of failure to coordinate their programs with NASA. Their proposed efforts include "Encapsulation and Recovery of Space Objects" and "Expandable Airlock/Crew Quarters/Hangar Technology". Their early experiments in this area are approved for the workshop. ✓

5. MTA: Testing of the Bendix and GM MTA's at Yuma Proving Ground was completed on February 15. All MSFC personnel connected with the activity have returned to Huntsville. ✓

6. S-IVB Workshop: Negotiations were held with Douglas Aircraft on Feb. 16 & 17 on the Advanced S-IVB Workshop. It is anticipated that the study will be initiated after March 1. ✓

7. LSSM: The LSSM Ad Hoc Technical Committee met February 16 to generate recommendations to be submitted to the LSSM SEB. Several areas are being explored and progress is being made toward the recommendation to SEB. ✓

Feb 27 1967

NOTES 2-27-67
WITH COMMENTS

MR. GORMAN'S COPY

No comment for DEP-A

NOTES 3-6-67
WITH COMMENTS

MR. GORMAN'S COPY

No DEP-A Action

NOTES BALCH 2/27/67

2/27/67

S-IC Testing - In joint NASA/Boeing meeting on 2/20/67, it was decided to conduct a second propellant load test on 2/24/67 and 2/25/67 and to reschedule first static firing to 3/3/67. Propellant load test was accomplished as planned. Only major problem encountered in RP-1 loading on 2/24/67 was lack of sufficient pressurization in RP-1 storage tank caused by GN_2 regulator malfunction, which was corrected. During LOX loading on 2/25/67, trouble with three LOX pumps was encountered, but this did not prevent successful tanking test. Loss of power to stage bus prevented wet simulated static firing. Cause of power loss has been identified and is being corrected. First firing is still set for 3/3/67. ✓

S-II-2 Testing - LOX tank inspection was completed, and tank was closed out on 2/22/67. Most serious squawk was a porous weld in aft facing sheet of common bulkhead. This was corrected by grooving out the porous area. Delinquent mod kit deliveries threaten to delay three major mods required prior to static firing. Total impact cannot be evaluated because there are no promise dates on some of the mod kits. The stage bottles which were in question because of the S-IVB explosion were checked and all were satisfactory. First static firing is still scheduled for 3/25/67. ✓

S-II A-1 Activation - Beneficial occupancy of entire A-1 complex has been completed, with exceptions. Completion of LH_2 dump and vent system is still scheduled for 3/7/67, and cold shock of the LH_2 system is still planned for 3/12/67. GSE checkout is proceeding as planned and is expected to be complete by mid-March. ✓

S-II Fit-up Fixture - The H7-17 fit-up fixture arrived at MTF on 2/21/67 and is scheduled to be used in the checkout of the S-II A-1 test stand from 3/4/67 to 3/8/67. ✓

2/27/67

ATM: A letter contract (go-ahead) was given to American Optical Company on Tuesday, Feb. 21, for development of an ATM 3-Axis Simulator.

Bendix was visited this week to discuss CMG funding requirements, schedules, and overall status. They are progressing rapidly in the detail design and have most of the long lead time items under contract. The funding requirements were found to be approximately \$4.5M through late July (we expected this) and schedules appear to be in good shape.

ORBITAL WORKSHOP: A meeting was held at R-ME on Feb. 23 to determine a schedule for the buildup of Orbital Workshop Preliminary Design Review (PDR) mockup here at MSFC. It was determined the earliest possible completion date is May 1, which means that the PDR cannot be conducted until this time. In order for DAC to meet the S-IVB 211 schedule the following is required: (a) Give immediate authority for DAC to begin modification design; (b) Authorize DAC to procure long lead time hardware prior to PDR; (c) DAC must start manufacturing in certain areas prior to PDR.

A letter is being prepared at MSC in response to our request for two Apollo Block II space suits for our neutral buoyancy test. MSC plans to furnish two modified Block II suits by mid March 1967.

LOCAL SCIENTIFIC SURVEY MODULE: The LSSM Procurement Plan was signed and approved by the AAP office in Headquarters Feb. 21. Dan Linn's office estimates that it will be submitted to Dr. Mueller sometime this week for approval.

AAP-1 THROUGH AAP-4 BASELINE MEETING: A meeting was held on Feb. 23, 24 and 25 by Mr. Mathews for the purpose of baselining the Cluster Mission. The meeting was attended by personnel from KSC, MSC, and MSFC. One of the primary points for discussion was the MDA design concept. A decision was reached for McDonnell to design and fabricate the lower 47 inches of the cylindrical section of the MDA, and MSFC would design, fabricate and integrate the remaining part of the MDA from that interface forward. It was also concluded that in order to adhere to the very tight schedule, the MDA and the Airlock will be mated at KSC for systems checks. Intermediate development tests will be conducted at both McDonnell and MSFC. The remaining items discussed and baselined will be summarized and distributed early in the week of Feb. 27, 1967.

2/27/67

2/27/67

J-2 ENGINE The Electrical Control Assembly failure at AEDC mentioned in last week's notes (2-20-67) has been attributed to an ignition phase solenoid failure (outside the ECA) which in turn caused a transistor in the ignition phase circuitry (within the ECA) to fail.

Three of the four planned tests at AEDC were completed satisfactorily 2-26-67. The fourth test was cancelled due to a suspected hydrogen leak in the cell. The first test was a simulated coldest condition SIVB first burn for 30 seconds. The second test was a 5-second SIVB restart with a hot thrust chamber and hot crossover duct. The third test was a 30-second SIVB first burn with nominal thrust chamber and crossover duct. ✓

H-1 ENGINE Two gas generator control valves have been removed from S-IB-206 at KSC, and returned to Michoud for inspection as follows:

(a) Engine H-7072 - Fuel was found in the gas gen combustor at KSC, and

(b) Engine H-4070 - A small piece of aluminum foil was found at the LOX inlet. Inspection at Michoud showed another small bit of contaminate (possibly aluminum foil) on the LOX poppet. A small quantity of fuel (1/2 cc) was found upstream of the fuel poppet.

Analysis indicated inadequate decontamination of the fuel bootstrap line after static test at MSFC.

A NASA Quality Control Survey was conducted by MSFC personnel at the Rocketdyne Neosho Plant during the week of February 13-17, 1967.

The Quality Control System showed significant improvement since the previous survey conducted in October 1966. The overall system was found to be in very good condition, however some minor deficiencies were found. Rocketdyne has corrected, or is studying methods to correct, these deficiencies. ✓

F-1 ENGINE During pretest preparation in the Test Lab, the LOX pump inlet of engine F-6049 was found to be contaminated with a mixture of metallic particles, rust and dirt. This engine was shipped from Rocketdyne to MSFC by truck as part of the feasibility study of truck transportation. The source of contamination has not yet been determined.

Four production F-1 engines (F-6053 thru F-6056) are presently being stored at Rocketdyne, Canoga Park, California, due to the unavailability of the Guppy aircraft.

As a result of the GSE line failure at KSC, reported last week, a visual inspection of the combustion side of the engine injectors was made. Two pieces of teflon were found, which do not appear to be engine parts. None of the metal chips reported missing last week have been located. A systematic inspection procedure to be used to determine extent of engine contamination with metal chips, is now approved and was initiated Friday, 2-24-67. The procedure requires disassembly of minor components in the LOX purge system, visual inspection of purge orifices and inspection by borescope of LOX valves and upper area of the main injector through access instrumentation and purge ports. Upon completion, a review of findings will be made prior to further engine teardown. ✓

Bill B
How do
you propose
to get on
top of this
problem??
B

←
The
contamination
problem
at
Rocketdyne
looks like
a mess
if major
propos-
tions!!

NOTES 2/27/67 CONSTAN

B_{3/3}

2/27/67

Nothing of special significance.

NOTES 2/27/67 FELLOWS

B 3/3

2/27/67

S-IC-1 Engine System Contamination Resulting from KSC GN₂ Facility Line Rupture: A survey of the S-IC-1 engine system, after rupture of the GN₂ facility line at KSC about mid-February, revealed 14 pieces of line material are missing. The S-IC-1 engine purge system will be inspected and purged by The Boeing Company to locate the missing material. The inspection will include a detailed examination of primary points where the pieces may be trapped between the umbilical and the engine check valve. Then a screen will be inserted ahead of the engine check valve and the engine line will be purged with GN₂ to carry any remaining particles to the screen. If particles are passed by the screen, it is the MSFC consensus that the particles are small enough to pass through the engine without damage. The inspection started on February 24 with KSC, MSFC, and Rocketdyne personnel observing. ✓

2/27/67

3 1/2

1. Orbital Aerodynamics: Our laboratory is devoting increased efforts to the preparation of orbital aerodynamic data to support the combined S-IVB workshop/ATM mission. Due to the complex structural geometry associated with it, we are confronted with excessive turn-around times for providing input data required for the attitude control design and mission analyses. We presently envision three cluster configuration iterations before production of final orbital aerodynamic data will be possible. Our present analytical approach maximizes the use of approximation techniques to reduce the turn-around time associated with each configuration change. With these simplified assumptions of the physics of the gas molecule-surface molecule interactions, the major problem in the calculations is due to one portion of the configuration shielding another portion from the flow. This is most critical in the calculation of the torques. While effects due to altitude on the concept of free molecular flow, temperature gradients on the body, varying surface materials, incomplete energy exchange by the molecules, etc., are not considered in our present analytical method, we are concerned with them, and are studying them using various analytical techniques such as Monte Carlo and modest low density wind tunnel experiments. The proposed Odyssey experiment should provide us additional knowledge concerning altitude effects on the free molecular concept and the gas molecule-surface interaction. We are expending considerable effort investigating simplified experimental techniques which will help to reduce the turn-around time required by each configuration change. ✓

2. TBC Incentive Contract: Recently, Boeing expressed concern about the amount of technical manpower ($\approx 10\%$) they're expending to produce necessary paperwork to maintain contract baseline. Recent survey in AERO indicates $\approx 8-10\%$ of our technical manpower is utilized by formality procedures under TBC incentive contract. Major impact in AERO is in Flight Test Analysis Division and Projects Office, where last minute changes in GFD cause excessive administrative burdens (paper work processing) to maintain contract baseline. We estimate this effort will increase another 5-10% as we approach launch dates, with the attendant schedule slips, mission changes, etc. To attempt to reduce this additional burden, we plan to discuss the problem with Col. Murphy (I-V), to determine whether the added burden on our technical manpower due to incentive contract features, is really justifiable to the program.

Hermann Geissler

Now that we have some practical (an-
nouncement of this particular part
- support contract, are you in fact
10% of both Boeing's and Aero's
far in excess of the beneficial effect
experience with the
systems engineering
in the position?
it seems like a waste
of effort! B

2/27/67

B
S/S

1. S-IC-2 CHECKOUT: Retest of the S-IC-2 stage was concluded and the stage transferred to Manufacturing Engineering Laboratory February 21, 1967, for additional modification and preparation for shipment. A number of discrepancies remain on the stage. Five electrical distributors contain relays suspected of internal contamination per information received from the Boeing Company. There are also problems with excessive expansion of the stafoam potting in four distributors. Due to the contaminated relay problem and the expanding foam, it is expected that all distributors will be removed for rework, inspection and functional test, and shipped to KSC separate from the stage. ✓
2. RELAY CONTAMINATION: A trip was made to Union Switch and Signal Company to determine the relay contamination source and to recommend corrective action. This contamination has resulted in relay failures at Boeing-Michoud. Union Switch Company work areas were found, in general, to be very dirty and the company is now in the process of correcting this condition. A round-the-clock schedule has been established in order to furnish 200 relays to Boeing by March 14, 1967. ✓
3. ROCKETDYNE/NEOSHO QUALITY SURVEY: A quality survey of the Rocketdyne/Neosho facility has been completed. Due to recent MSFC emphasis, Rocketdyne was continuing to make progress in eliminating causes of contamination. However, several areas which need additional attention were brought to the contractor's attention. Another item of significance was insufficient planning by the contractor's quality assurance group to insure adequate inspection of manufacturing and testing operations. The survey team also recommended to Rocketdyne that quality personnel perform acceptance of in-house manufactured components. This would insure emphasis being placed on quality assurance. Procured components are presently acceptance tested by quality personnel. ✓

NOTES ²1/27/67 HAEUSSERMANN

B 3/3

2/27 JVS

1. LM/ATM Payload. For AAP vehicles 1 through 4, NASA Headquarters (C. Mathews) ground ruled that payload weights are budgeted to 5% less than launch vehicle payload capability. Based on present status LM/ATM is 1300 pounds overweight. Optimization of injection altitudes for AAP-3 and 4 will be studied (R-AERO) to see what increases can be achieved for the AAP-4 payload capability. Astrionics Laboratory will explore what possibilities exist for weight reductions of the sub-system elements. A third possibility is the elimination of some of the ATM capabilities. The latter is to be considered as a last resort. ✓

2. ATM Program Documentation. The following documents which establish the anticipated flight environments and test program guidelines were released February 23, 1967.

- a. ATM Environmental Design Qualification Test Criteria
- b. Electromagnetic Compatibility Control Plan
- c. ATM Test Program Guidelines ✓

S-IC (MTF)

The second successful propellant load test was performed by Boeing on the S-IC-T stage at MTF February 24 and 25, 1967. The S-IC-T static firings are scheduled for March 3 and 14, 1967, for 15 seconds and 40 seconds, respectively. ✓

F-1

F-1 engine S/N F-6049 (spare engine for S-IC-6) was received at the Test Laboratory Engine Support Shop on February 21, 1967. The lox pump was found to be contaminated and will have to be partially disassembled and cleaned. This work will be performed by Rocketdyne personnel with all necessary assistance furnished by Test Laboratory. The source of contamination has not been determined at this time. ✓

S-IB-9

Test SA-42 was conducted at approximately 5:08 p.m. on February 24, 1967. The scheduled 35 seconds test was cutoff prematurely by the automatic cutoff system. The cutoff was erroneous and caused by a power failure in the computerized data system monitoring the lube oil pressures (number 1 bearing jet) of all four outboard engines. Since these pressures were erroneously indicated to be below the redline minimum, cutoff command was initiated upon expiration of the ten seconds timer. Strip chart records indicated satisfactory lube oil pressure. The test will be repeated on February 27, 1967.

K.H.
No backup power source to take over automatically?
B

S-IVB (MSFC)

The first hot test of the O_2H_2 burner is scheduled for March 2, 1967. ✓

PRIMARY DAMPER SYSTEM

The test on the Primary Damper System was successfully completed on February 20. It was removed from the test stand on February 21, and turned over to ME Laboratory for refurbishment and shipment to KSC. On dock date at KSC is scheduled for March 1, 1967. ✓

AUXILIARY DAMPER SYSTEM

The modified hook mechanism is scheduled to be received from ME Laboratory on March 6, for continuation of the test. On dock date at KSC is scheduled for March 15, 1967. ✓

NOTES 2-27-67 HOELZER

2/27/67

B
3/3

NEGATIVE REPORT.

NOTES 2/27/67 JOHNSON

2/27/67

B
3/3

Initiation and Obligation of SRT funds:

As of Friday, 2/24/67, initiation and obligation for procurements in the Supporting Research and Technology Programs stood at:

	Authority (\$1000's)	Initiated	Obligated
OART	15, 950	11, 825	3, 669
OMSF*	2, 675	1, 342	565
OSSA	795	434	2
OTDA	773	415	325

*Does not include: (1) \$9, 000K for C-1 Engine
(2) \$1, 021K for Flight Experiment Development

The remaining funds are planned to cover:

	No. Contracts	Value (\$1000's)	Initiation Complete
OART**	62	4, 125	4/15/67
OMSF	10	1, 333	3/15/67
OSSA	3	361	3/15/67
OTDA	7	358	3/10/67

**Task Code, 121-30-04-06, Nuclear Ground Test Module (NGTM) and associated task requirements not firm at this time according to lead laboratory (P&VE). The NGTM has been a problem since early 1966 due to lack of program definition. Since doubt exists at HQ's as to whether Congress will approve future nuclear rocket programs, it is essential that extreme care be taken in spending available funds in this area.

According to FMO last week, an additional 1.4M authority in Program 731, Chemical Rocket Experiments Engineering, is expected from OART.

Bien.

noted. ok 3/6

Please lay on a somewhat more detailed briefing on SRT fund status during 1st or 2nd week in April. Suggest 1 hr. B

NOTES 2-27-67 KUERS

2/27/67

B
3/3

Assistance to Army on Shillelagh Program:

Manufacturing Engineering Laboratory personnel are responding to a request from the Army's Col. S. R. Baen, Shillelagh Project Manager, through Mr. D. H. Newby in solving a problem encountered in fabricating, on a production basis, the Shillelagh Rocket motor case. Cracks in parent material, weld associated cracks, and thermal treatment distortion are identified as primary problems in processing the high strength steel case.

Marshall personnel participated in a preliminary exploration meeting at Redstone on February 21, where design options were explored. ME Laboratory engineers have been asked to accompany Army personnel next week on a visit to several West Coast organizations who are experiencing the processing difficulties. ✓

2/27/67

B 3/3

1. APOLLO TELESCOPE MOUNT (ATM): The preliminary design drawings for the ATM Rack structure were completed and released to Manufacturing Engineering Laboratory for tool design initiation. Copies of the preliminary design drawings were also distributed to other organizations for coordination purposes. The structural design as shown in the preliminary drawings was accepted by Astrionics as satisfactory for the current CMG configuration. A structural arrangement drawing was completed for the experiment package shroud. A decision to insulate the exterior of the experiment package with multilayer insulation has resulted in a need for a mockup of the shroud and spar to develop insulation application techniques. The mockup can be satisfactorily manufactured from the structural arrangement drawing. ✓

2. ORBITAL ASTRONOMICAL OBSERVATORY (OAO): The OAO utilizes a Kollmann star tracker altitude sensor which incorporates Ball Brothers' brushes. The Goddard Space Flight Center has determined that these brushes (impregnated graphite) are unsatisfactory, and has requested our assistance in finding a brush material that will not fail under operating conditions and that can be replaced without schedule impact. We are attempting to help Goddard and will supply brushes from composites developed by the Materials Division. ✓

3. J-2 ENGINE CROSS-OVER DUCTS: Tests have indicated that Dynatherm D-4327 will be satisfactory for use on the J-2 cross-over ducts and turbine housings for reducing engine temperature, thus enhancing satisfactory restart. This material has been investigated from an optical, mechanical, and LOX compatibility standpoint. D-4327 can be brushed on and does not require removal of the components for installation. ✓

4. ORBITAL ABORTS: Abort sequence and alternate missions following a premature J-2 shutdown during second burn have been planned on the assumption that the vehicle will be stable and specified attitudes could be held. However, the large amounts of propellants left on board the S-IVB will not be positioned and are free to move about inside the tanks in response to external disturbances. The effect of such propellant movements on vehicle dynamics is being studied by R-AERO. We recommend consideration of simulation tests on unmanned Saturn flights such as -502.

B.L. Risks to success of 502?

5. NUCLEAR GROUND TEST MODULE (NGTM): Representatives from the Space Nuclear Propulsion Office and Aerojet (REON) gave a presentation on "O" NPSP and turbo-pump concepts. Aerojet is reopening the "O" NPSP concept for the nuclear rocket based upon scale model LH₂ nuclear radiation heating experimental data. Aerojet has been scheduled to brief us on March 2, 1967; thereafter, an assessment will be made. ✓

6. S-IC-1 LOX SYSTEM CONTAMINATION INVESTIGATION: The disassembly and borescope portion of the inspection was completed yesterday with no sign of the anticipated contamination. Three small metallic particles were swabbed out of one LOX dome but were not part of the flexible hoses. A 3/16 inch bolt approximately 3/4 inches long was found on the back side of the main LOX injector on position five. It was retrieved thru a purge port and an attempt is being made to determine its origin. The system will be purged and the wrap-around lines removed and cleaned today. ✓

2/27 983

B
3/2

MSFC ADP MANAGEMENT STUDY - The Booz, Allen and Hamilton contracted portion of the MSFC ADP Management Study which we have been heavily involved in is entering its final phase. To date Booz, Allen and Hamilton has:

1. Verbally presented preliminary recommendations of concepts for ADP management including organization.
2. Provided preliminary written reports covering
 - a. Concepts for ADP Management including organization
 - b. ADP Management information systems
 - c. Approaches to meeting area contractors ADP requirements.
3. Discussed their findings and recommendations with MSFC Executives (Dr. Rees, Mr. Gorman, Mr. Neubert, Mr. Weidner, Dr. Hueter and Dr. Hoelzer).

The ADP Steering Group representing various MSFC elements have individually submitted comments on the preliminary reports which are being made available for Booz, Allen and Hamilton's use. Another meeting is scheduled for discussion with MSFC Executives on February 28, 1967.

Drafts of the final report which will be more inclusive than the preliminary reports are expected from Booz, Allen on February 28, 1967. Results of the executives session and comments by the ADP Steering Group will be utilized to prepare the final reports by April 26, 1967. ✓

NOTES - 2/27/67 - RICHARD

2/27/67

B 3/3

No submission this week.

NOTES 2/27/67 RUDOLPH

B
2/3

1. AS-501 Launch Vehicle at KSC:

o S-IC-1 Stage/engine disassembly, based on Facilities flex line break (enc. notes 2/20/67), has revealed no trapped contamination. A bolt (approx. 3/16" x 3/4"), yet unidentified as to source, was removed from the LOX injector of Center engine. Final position from P&VE/QUAL is expected today, Mon, 27 Feb 67, in order that firm decision can be furnished KSC as to follow-on action.

o S-II Stage was erected Thurs, 23 Feb 67; S-IVB Stage on Fri, 24 Feb 67; and IU Stage on Sat, 25 Feb 67. Spacecraft erection scheduled for Wed, 1 Mar 67.

o Approximately 6,600 manhours of open work remain on S-II-1. Work packages have been reviewed to insure this open work can be completed in the stacked condition.

o Rollout is scheduled for Thurs, 30 Mar 67, although informal discussions indicate approximately 2 weeks delay. (Sensitive)

o The pre-rollout review (your request) is scheduled as a part of my Pre-Flight Review on Mar 22, 23 and 24, 1967. Colonel Petrone and Dr. Gruene have assured me they will participate.

2. AS-500D Dynamic Testing:

o A major anomaly occurred in the EDS/Control Rate Gyro during Configuration I pitch testing, caused by improper mounting location.

o The IU cold plate, on which the gyro is mounted, deforms during pitch tests due to structural "feedback" load from Spacecraft LEM Adapter (SLA).

o Configuration I testing will continue in order that the "fix" can be confirmed. It is estimated that AS-501 launch will not be impacted.

3. S-IC-T Stage - Systems Demonstration Test at MTF: First captive firing (15 seconds duration) is now scheduled for Fri, 3 Mar 67. Next short duration firing will be 40 seconds, which will complete Systems Demonstration Test.

4. AS-502 Launch Vehicle:

o S-IC-2 Stage will leave Huntsville by barge on Fri, 3 Mar 67, and is expected on-dock KSC on Mon, 13 Mar 67.

o S-IVB-502 Stage arrived at KSC on Tues, 21 Feb 67 and was placed in the low bay checkout position on Fri, 24 Feb 67.

5. Saturn V Quality Maintenance Program: Quality Lab has prepared a plan to establish more rigorous controls in major contracts. I recommend this presentation be given to you, Dr. Rees, Mr. Gorman and General O'Connor at an early date.

Shop When shall we hold that? 1/2 part of 1.0's
Summary action review resulting from opp.
1 Attachment - Notes 2/20/67 Rudolph (DIR, I-DIR and R-DIR's copy only) letters to the contractor presidents?

NOTES 2/27/67 SPEER

2/27/67

3/3

1. SOFTWARE INTERFACE TESTS (SIT): Our Flight Control Office at MSC in conjunction with the R&D Labs and the Program Offices has finalized and documented the SIT requirements for pre-launch tests of all ground commands between the Control Center (MCC-H) and the launch vehicle. In essence, all contingency ground commands will be radiated to the vehicle from the MILA Unified S-Band Site at the correct simulated time into the mission; and the telemetered response will be transmitted to the MCC-H. The necessary coordination with KSC is performed through the Apollo Test Integration Working Group. A total of four SIT is planned for each vehicle starting approximately 45 days before launch. ✓

2. HOSC BUILDING ADDITION: Construction of the Huntsville Operations Support Center (HOSC) addition has been completed with the exception of an air-conditioning sump pump, which will not hinder beneficial occupancy. Completion has been accomplished one month ahead of schedule due to the excellent efforts of F&D and the construction contractor. Remaining major tasks are installation of communications, movement of the display consoles into the new addition, and modifications of the old area to accommodate the Wind Monitoring Activities presently housed in a trailer. There are several critical schedule items in completing these tasks, but we now firmly plan on use of the addition for AS-501 and/or AS-206. ✓

ES 1. ATM: Our program for defining environmental contamination and its effect on the ATM experiment is now well defined. It consists of three basic phases; studies, laboratory investigations and inflight experiments. All three will be conducted concurrently. The program has already provided positive and useful data as to spacecraft materials to be avoided. A configuration and materials management activity is being established under P&VE direction to control materials usage. B_{3/3} 9/5 2/27

E.S. It appears that we may have a serious radiation problem which could completely fog all photographic film after three or four days. The problem is due to the high proton flux in the anomalous magnetic field at the mission altitude and inclination. In the event the problem is indeed a real one, either extensive shielding in the camera and film storage areas, or the selection of a more favorable orbit may be necessary. Horizon aware of this? When will we know for sure?

Plans to expose ATM type film to energetic proton, electron, and gamma sources are underway. The film has been ordered and is scheduled for delivery on March 17. A meeting with members of Martin/Denver and ASTR was held last week to discuss the effects of environmental parameters on the film. We will keep close contact with the ATM Project Offices with respect to continuing studies of this problem.

2. PEGASUS: (See Notes of 2/13, attached). I am not sure whether you felt that there was a discrepancy between Bill Johnson's Note and mine. Actually, there is none. Both Notes state that the experiment was cancelled for AAP-1 because the required EVA is too complicated for an early AAP mission, and that OART and OMSF will continue to work together for a later flight, possibly AAP-5. Dr. Mueller's decision was not a surprise to us; in fact, we are quite agreeable to a later rendezvous experiment. AAP-5 still looks acceptable from an orbit decay standpoint.

3. NGTM (Nuclear Ground Test Module) Radiation Studies: Members of RPL, P&VE, and ASO attended a presentation by General Dynamics, Ft. Worth, on their proposed LH₂ nuclear irradiation tests. General Dynamics proposes to take measurements of neutron and gamma dose rates within the existing 9' tank during the insulation irradiation tests. They favor an additional series of tests, however, which would use a new tank of the same diameter, but 75" longer, which gives an L/D = 2.15, the same as the NGTM, to obtain more realistic measurements of neutron and gamma heat deposition and thermodynamic effects. The cost estimate for energy deposition work is about 300 K. Dave Miller of HQ has been unofficially talking in terms of about 150 K. We will talk to him further this week, and we will try to evaluate the General Dynamics proposal.

We also discussed with representatives of Test Lab and ASO nuclear instrumentation applicable to the NGTM. Research Projects has been requested to prepare the nuclear instrumentation list for the NGTM.

4. PRESENTATION ON THERMIONIC POWER SUPPLY: Dr. Pidd, General Atomic, had been scheduled today for a briefing to you on nuclear-thermionic power supplies. Here are some highlights of the presentation: Pidd says that they can build a 100 kwe ground prototype reactor system in 4-5 years for \$25-30 million. To go to a flight type system, concurrent development by AEC and NASA in the areas of compact heat pipe radiators, shielding, controls, and pumps, would be needed. The weight of the system would be about 25 lb/kwe unshielded. Unmanned shielding would raise it to 30-35 lb/kwe, and manned shielding to about 50 lb/kwe.

Didn't come to pass B_{2/3} 15/4 3/16

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SYSTEMS ENGINEERING CONTRACT: We finally completed agreement with CCSD on Friday, February 24, of the essential provisions of the systems engineering and integration contract. The target cost from November 1, 1966 to runout is \$21.9 M with a 70/30 Government/contractor cost share line for both overrun and underrun. The target fee is 7.8 percent with a minimum fee of 3 percent and a maximum of 14 percent. There is also a 65/35 percent cost versus performance/schedule provision on the incentive portion of the contract. ✓

SACTO BETA III REFURBISHMENT: Continued study on maximum salvage of the damaged Beta III test stand has indicated that we can repair the stand for approximately \$2.393 M. We have forwarded this new estimate to Gen. Phillips with the repeated recommendation that we proceed to repair the stand. ✓

SA-204 LAUNCH VEHICLE: The SA-204 launch vehicle has been released to us. Starting today KSC plans to spend 14 working days rechecking the missile ending with a Plugs-In test. No changes will be permitted to the vehicle or GSE until these checks are completed. ✓

NOTES 2/27/67 WILLIAMS

B 3/3

1. Space Biology "Awareness Program": The Space Biology "Awareness Program" is beginning to pay off. As you directed, R-AS-(Von T/Hilchey) have been making active contacts with NASA elements responsible for Space Biology and Biotechnology. We have been stimulating interest in AAP, the workshop, and the space stations as experiment carriers and in MSFC as an organization ready to help them implement their programs. Results - Space Biology subcommittee of the space science steering committee will hold their next meeting at MSFC on March 30-31, 1967, (Memos to MSFC elements affected are in preparation). This top level advisory group to Biosciences Division, OSSA, and deserves our best efforts. They ask for a solid briefing on AAP, the workshop, and the space station. Biosciences Division of OSSA is in an all-out effort to prepare a space biology program taking advantage of all possible manned systems. They want a two-hour date with you (Dr. von Braun) to give you a high-level presentation on what they want to do and what sort of help they want from MSFC. This meeting will lay groundwork for firm commitments to MSFC/OSSA cooperation on the Space Biology Program.

note
3/16/67

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2. VOYAGER: Since we did not finish in our Friday meeting, we will arrange with Dr. Stuhlinger and Dr. Hale for a session with you in Washington next week to discuss status of planning on science/experiments. In addition, we will follow up on several points raised during the Friday meeting, and give you a summary report later.

→ Have that briefing B 3/3